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Revision 0

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***Annual Groundwater
Monitoring Status Report for
Waste Area Group 2 for
Fiscal Year 2003***

October 2003

**Idaho
Completion
Project**

Bechtel BWXT Idaho, LLC

*Idaho National Engineering and Environmental Laboratory
Bechtel BWXT Idaho, LLC*

Annual Groundwater Monitoring Status Report for Waste Area Group 2 for Fiscal Year 2003

October 2003

**Idaho Completion Project
Idaho Falls, Idaho 83415**

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Annual Groundwater Monitoring Status Report for Waste Area Group 2 for Fiscal Year 2003

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Revision 0**

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ABSTRACT

This report presents the results of groundwater monitoring activities conducted at Waste Area Group (WAG) 2 during Fiscal Year 2003. Groundwater samples were collected from three perched water wells and six Snake River Plain Aquifer wells. Four perched water wells were dry and, therefore, not sampled. Constituents included in the analysis were cadmium, chromium, tritium, strontium-90, and gamma-emitting isotopes. Using an interface probe, additional monitoring was conducted at one perched water well in June 2003 to determine the presence and thickness of a floating organic layer at the water table.

In perched water wells, tritium, strontium-90, radium-226, and cobalt-60 were detected above their respective maximum contaminant levels (MCLs). Tritium was detected above its MCL of 20,000 pCi/L in well PW-11. Strontium-90 was detected above its MCL of 8 pCi/L in wells PW-12 and USGS-054. Radium-226 was detected in wells PW-11, PW-12, and USGS-054 above the MCL of 5 pCi/L but fairly near the minimum detectable activity. Analysis for radium-226 was conducted using gamma spectroscopy, which is known to have a high bias for radium-226. Cobalt-60 was detected above its MCL of 200 pCi/L in well PW-12.

In the aquifer wells, chromium was the only constituent detected above its MCL. Chromium concentrations in wells TRA-07, and USGS-065 were greater than the 100 µg/L MCL, with a maximum concentration of 159 µg/L in TRA-07. However, except for well Highway-3, chromium concentrations were above background chromium concentrations at the INEEL in all other aquifer wells sampled in WAG 2. All other constituents were below MCLs, although tritium concentrations were above background concentrations in all aquifer wells except Highway-3.

Water level measurements were collected in WAG 2 during October 2002 to evaluate the direction of groundwater flow. Water level measurements indicate a general south-southwest flow in WAG 2.

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ACRONYMS

DOE-ID	U.S. Department of Energy Idaho Operations Office
EPA	U.S. Environmental Protection Agency
FY	fiscal year
INEEL	Idaho National Engineering and Environmental Laboratory
MCL	maximum contaminant level
MDA	minimum detectable activity
ND	nondetection
PD	perched water
RPD	relative percent difference
SAM	Sample and Analysis Management
SRPA	Snake River Plain Aquifer
USGS	U.S. Geological Survey
WAG	waste area group

Annual Groundwater Monitoring Status Report for Waste Area Group 2 for Fiscal Year 2003

1. INTRODUCTION

Groundwater samples from the Snake River Plain Aquifer (SWA) and perched water locations beneath Waste Area Group (WAG) 2 were collected and analyzed in Fiscal Year (FY) 2003 in accordance with the requirements delineated in the *Groundwater Monitoring Plan for the Test Reactor Area Operable Unit 2-13* (DOE-ID 2003a), hereafter referred to as the groundwater monitoring plan.

Groundwater monitoring being conducted satisfies some of the requirements set forth in the *Final Record of Decision for Test Reactor Area for Operable Unit 2-13 at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 1997) and the *Record of Decision for the Test Reactor Area Perched Water System, Operable Unit 2-12* (DOE-ID 1992). This FY 2003 report is the first annual report following completion of the *First Five-Year Review Report for the Test Reactor Area, Operable Unit 2-13, at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 2003b).

Groundwater samples were collected during October 2002 and March 2003 to complete the WAG 2 sampling for FY 2003. Samples were collected from six wells completed in the SWA and three wells completed in perched water bodies above the SWA. Sampling was conducted to: (a) evaluate the effects of discontinued discharge to the former warm waste ponds on contaminant concentrations in the deep perched water system and the SWA, (b) verify the accuracy of the contaminant concentration trends in the SWA predicted by computer modeling, and (c) verify that groundwater concentrations do not increase to unacceptable levels.

Sample concentrations of cobalt-60 and strontium-90 from well PW-12 were elevated during the October 2002 and March 2003 sampling events. Consequently, additional samples were collected from wells PW-12 and PW-13 in June 2003 to specifically check the concentration of cobalt-60, strontium-90, and tritium.

1.1 Purpose

This document presents and summarizes groundwater sample data collected during FY 2003 for the wells covered under the groundwater monitoring plan (DOE-ID 2003a). The data presented here supplement groundwater monitoring data presented in the first five-year review report (DOE-ID 2003b) and are a compilation of the data for the potential contaminants in the WAG 2 groundwater. Contaminant concentrations and trends are discussed in Section 2, water quality is examined in Section 3, and recommendations are presented in Section 4 of this document.

1.2 Groundwater Monitoring Requirements

The groundwater monitoring plan (DOE-ID 2003a) calls for samples to be collected from perched water wells PW-11, PW-12, PW-14, USGS-053, USGS-054, USGS-055, and USGS-056. But no samples were collected from perched water wells PW-14, USGS-053, USGS-055, and USGS-056, because they contained no water. In addition, well PW-13 is to be monitored with an interface probe to determine the presence and thickness of a floating organic layer. Groundwater samples are also required from aquifer wells TRA-06A, TRA-07, TRA-08, USGS-058, USGS-065, and Highway-3. With the exception of well Highway-3, aquifer well samples were analyzed for cadmium (filtered and unfiltered), chromium (filtered and unfiltered), and tritium. Only chromium analysis was performed on samples from the Highway-3 well. Perched water samples were also analyzed for gamma-emitting isotopes and strontium-90.

Groundwater monitoring at WAG 2 will continue until the U.S. Department of Energy Idaho Operations Office, U.S. Environmental Protection Agency (EPA), and Idaho Department of Environmental Quality determine that monitoring is no longer necessary based on results from a five-year review. Table 1 summarizes the construction details for each of the WAG 2 groundwater monitoring wells.

Table 1. Summary of well information for WAG 2 groundwater monitoring wells.

Well Name	Total Depth (ft)	Brass cap Elevation (ft)	Screened Interval(s) Below Land Surface (ft)	Well Use
PW-11"	169	4,916.5	109-12'9	Monitoring
PW-12"	141	4,923.7	108-128	Monitoring
PW-13"	149	4,923.8	57-87	Monitoring
PW-14"	136	4,918.7	93-123	Monitoring
USGS-053"	90	4,922.1	50-67 75-80	Monitoring
USGS-054"	91	4,920.9	60-91	Monitoring
USGS-055"	81	4,919.1	44-81	Monitoring
USGS-056"	80	4,921.4	59-80	Monitoring
TRA-06A	562	4,925.6	528-558	Monitoring/water level
TRA-07	501	4,931.6	463-493	Monitoring/water level
TRA-08	501	4,934.9	471-501	Monitoring/water level
MTR Test	588	4,719.18	447-588	Water level
SITE 19	865	4,926.32	472-512 532-572 596-616 780-862	Water level
USGS-058	503	4,918.37	218-503	Monitoring/water level
USGS-065	498	4,925.0	456-498	Monitoring/water level
USGS-076	718	4,929.69	457-718	Water level
USGS-079	702	4,931.08	281-702	Water level
USGS-099	450	4,872.36	340-450	Water level
USGS-121	745	4,909.65	449.475	Water level
Highway-3	750	4,981.6	680-750	Monitoring/water level

a. Perched water wells.

2. MONITORING RESULTS

During FY 2003, groundwater samples were collected from nine perched water and aquifer wells in the WAG 2 area. Sample analyses were performed in accordance with established Idaho National Engineering and Environmental Laboratory (INEEL) and EPA methods, with the exception of radionuclide analyses. The radionuclide analyses were performed in accordance with the requirements delineated in the *Idaho National Engineering and Environmental Laboratory Sample Management Office Statement of Work for Analytical Services* (INEEL 2002). This statement of work establishes the minimum required detection limits and quality assurance requirements for the analytical methods to be employed. All analytical results were validated to resident procedures established by INEEL Sample and Analysis Management (SAM). Table 2 presents the sample data from all the wells for the analytes from which there was at least one positive detection during the FY 2003 sampling. Complete sampling results are presented in Appendix A.

Table 2. Summary of analytes in the WAG 2 wells for the detected constituents.

Well	Sample Date	Strontium-90		Tritium		Cobalt-60		Radium-226		Filtered Chromium	Filtered Cadmium
		MCL = 8pCi/L	pCi/L	MCL = 20,000 pCi/L	pCi/L	MCL = 200 pCi/L	pCi/L	Error	MCL = 5 pCi/L	pCi/L	Error
PW-11 ^a	Oct-02	1 64	0 30	50,200	584	NE	—	NE	—	47 6	NE
PW-11 ^a	Mar-03	1.99	0 35	43,800	648	NE	—	9 45	3 72	36 9	NE
PW-12 ^a	Oct-02	88 4	12 00	3,040	132	98	6 77	NE	—	3 2	NE
PW-12 ^a	Mar-03	77 2	11 50	4,430	194	330	17 90	20 40	5 28	NE	NE
PW-12 ^a	Tun-03	73 3	9 39	2,400	181	161	10 80	NE	—	NS	NS
PW-12 ^a Dup	Tun-03	75 1	9 27	2,270	176	174	11 40	NE	—	NS	NS
PW-13 ^a	Tun-03	41 7	5 25	NE	—	NE	—	NE	—	NS	NS
USGS-054 ^a	Oct-02	66 9	10 60	1,030	102	NE	12 1	NE	2 67	9 2	NE
USGS-054 ^a Dup	Oct-02	62 9	9 96	1,190	114	NE	1.00	NE	2 95	9 7	NE
USGS-054 ^a	Mar-03	63 1	7 86	914	115	NE	140	54 90	6 09	9 7	NE
USGS-054 ^a Dup	Mar-03	64 2	8 30	1,090	120	NE	120	51 60	6 21	9 21	NE
USGS-058	Oct-02	NS		0	113	NS		NS		11 4	NE
USGS-058	Mar-03	NS		1,600	141	NS		NS		131	0 069
USGS-065	Oct-02	NS		10,700	225	NS		NS		134	NE
USGS-065	Mar-03	NS		9,920	289	NS		NS		118	NE
TRP-06A	Oct-02	NS		2,490	136	NS		NS		8 3	NE
TRP-06A	Mar-03	NS		2,510	166	NS		NS		9 55	NE
TRP-07	Oct-02	NS		14,500	262	NS		NS		159	NE
TRP-07	Mar-03	NS		16,700	416	NS		NS		158	NE
TRP-08	Oct-02	NS		5,310	162	NS		NS		57 1	NE
TRP-08	Mar-03	NS		4,410	213	NS		NS		46 3	NE
Highway 3	Oct-02	NS		NS		NS		NS		1 4	NE
Highway 3	Mar-03	NS		NS		NS		NS		NE	NE

a = Perched well
 NS = Not sampled
 ND = Not detected
 Red = Concentrations that exceed MCLs

2.1 Perched Water Wells

Groundwater samples were collected from perched water wells PW-11, PW-12, and USGS-054. Samples were not collected from perched water wells PW-14, USGS-053, USGS-055, and USGS-056, because no water was present in the wells at the time of sampling. Perched water samples were analyzed for cadmium (filtered and unfiltered), chromium (filtered and unfiltered), strontium-90, tritium, and gamma-emitting isotopes. Only the concentrations for radiological analytes are reported in the text of this

document. Associated uncertainties are recorded in Table 2 and Appendix A. The individual constituents are summarized in the following subsections. Sample concentrations are compared with maximum contaminant levels (MCLs). However, these comparisons are not intended to imply that the perched water bodies represent an aquifer capable of long-term use.

2.1.1 Cadmium

Cadmium was not present at detectable concentrations in any of the samples collected from perched water wells during the FY 2003 sampling.

2.1.2 Chromium

Chromium analytical results from the perched water wells were below the EPA-defined MCL of 100 µg/L during the FY 2003 sampling events. However chromium concentrations do exceed background concentrations in wells PW-11, PW-12, and USGS-054. As discussed in Subsection 2.2.2, chromium concentrations in aquifer samples from two wells exceeded the MCL. Figures 1 and 2 show filtered chromium concentrations in the individual wells (perched and aquifer) from October 2002 and March 2003.

2.1.3 Gamma-Emitting Isotopes

Two gamma-emitting isotopes (cobalt-60 and radium-226) were present at detectable concentrations during the FY 2003 sampling events. Cobalt-60 was detected in samples from well PW-12, while radium-226 was detected in samples from wells PW-11, PW-12, and USGS-054.

Although not detected in any of the wells during the October 2002 sampling event, radium-226 was present during the March 2003 sampling event in well PW-11 at 9.45 pCi/L, in PW-12 at 20.4 pCi/L, and in well USGS-054 at 54.9 (51.6 pCi/L in the field duplicate sample). All of these concentrations exceed the EPA-defined MCL of 5 pCi/L for radium-226/radium-228. However, radium-226 results were obtained by direct gamma spectrometry and are flagged with "J" validation flags as estimated values. General Engineering Laboratories quantifies radium-226 using bismuth-214 daughter photopeak at 609 keV. It is not possible to quantify radium-226 by spectrometry without a separate analysis to allow time for the ingrowth and equilibration of radon daughter products. Therefore, sample results are not considered to truly represent the radium concentrations in the groundwater.

Cobalt-60 was detected in samples from well PW-12 at concentrations of 98.2 pCi/L in October 2002, 330 pCi/L in March 2003, and 161 pCi/L (174 pCi/L) in June 2003. The 330 pCi/L sample is above the EPA-defined MCL of 200 pCi/L for cobalt-60, and matches the ten-year maximum concentration from this well. Cobalt-60 was not present at detectable concentrations in any of the other wells. Figure 3 shows the cobalt-60 trend in well PW-12. Although the cobalt-60 results from well PW-12 are higher than recent sample results, other gamma constituents that would generally be expected to accompany cobalt-60 (cerium-144, cesium-137, etc) are not present. The elevated cobalt-60 results appear to be anomalous, but continued monitoring will be conducted to verify results. The minimum detectable activity for cobalt-60 during the FY 2003 sampling was generally between 3.5 and 5 pCi/L.

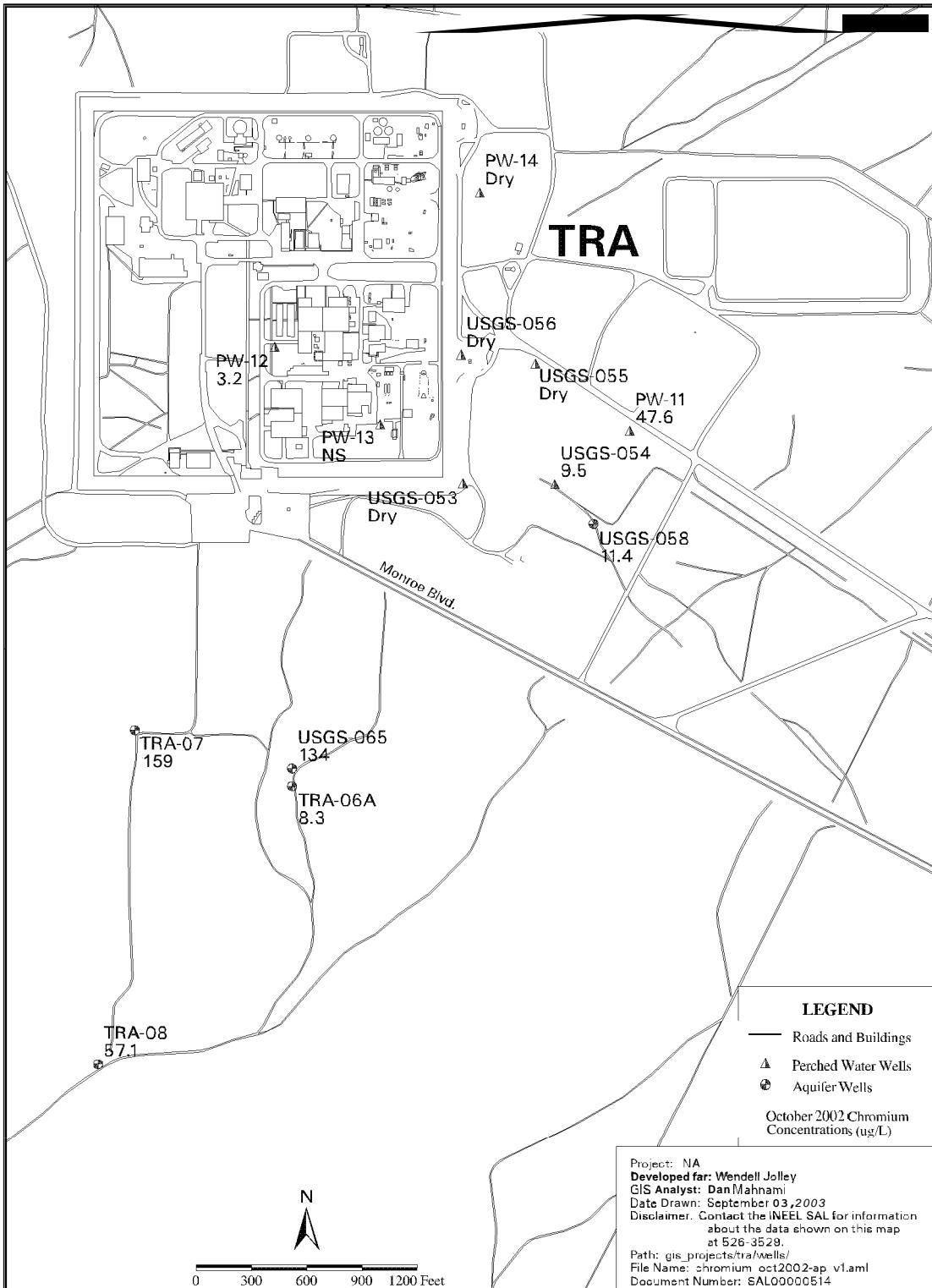


Figure 1. Chromium concentrations from October 2002.

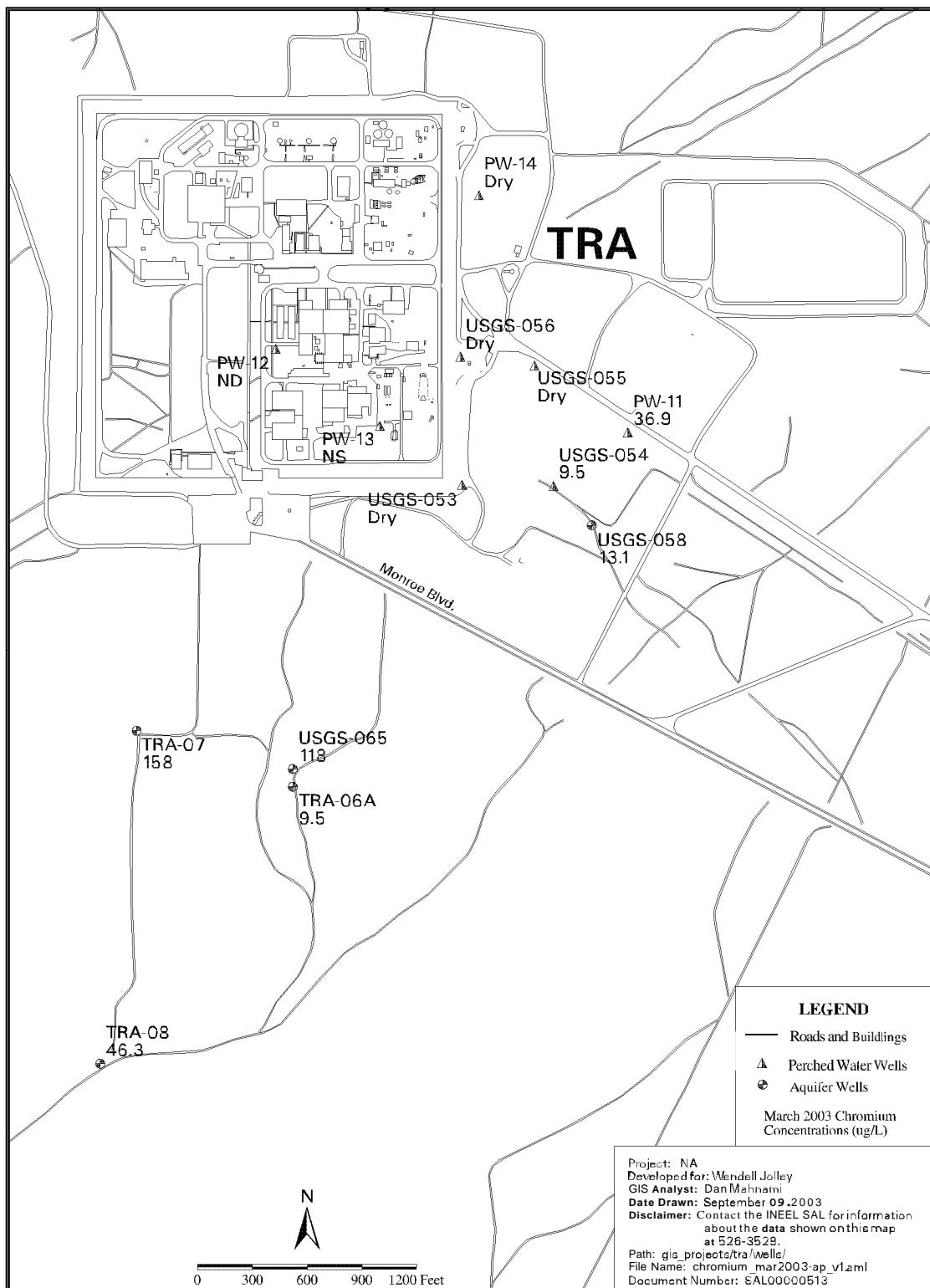


Figure 2. Chromium concentrations from March 2003,

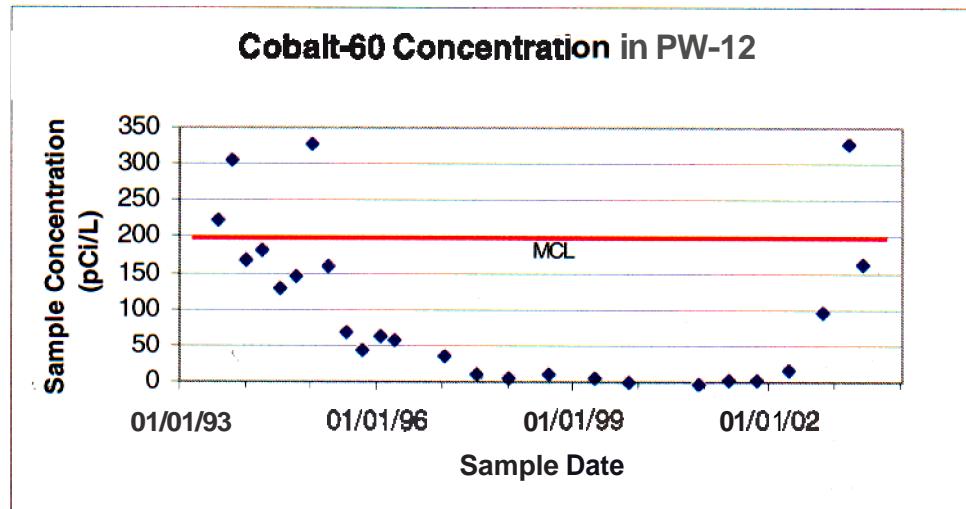


Figure 3. Cobalt-60 in PW-12.

2.1.4 Strontium-90

Strontium-90 results ranged from 1.64 to 88.4 pCi/L in the three perched water wells sampled, but only wells PW-12 and USGS-054 exceeded the EPA-defined MCL of 8 pCi/L. Well PW-12 had concentrations of 88.4 pCi/L in October 2002 and 77.2 pCi/L in March 2003, and USGS-054 had concentrations of 63.1 pCi/L (64.2 pCi/L for the field duplicate) in October 2002 and 66.9 pCi/L (62.9 pCi/L for the field duplicate) in March 2003. During the additional sampling round in June 2003, samples were collected from wells PW-12, and PW-13. Strontium-90 was present in well PW-12 at concentrations of 73.3 pCi/L (75.1 pCi/L in the field duplicate) and in well PW-13 at 41.7 pCi/L. The minimum detectable activity for strontium-90 was generally between 0.4 and 0.07 pCi/L. Figures 4 and 5 show strontium-90 concentrations in the individual wells.

Statistical trend analysis of wells PW-12 and USGS-054 indicates that well PW-12 has a positive slope, while USGS-054 has a negative slope. However, with correlation coefficients of 0.567 and 0.644 for PW-12 and USGS-054, respectively, neither well shows a distinct trend in strontium-90 concentrations. Figures 6 and 7 illustrate the trend plots for these wells.

2.1.5 Tritium

Tritium is present at detectable concentrations in all of the perched wells sampled but only exceeds the 20,000 pCi/L MCL in well PW-11, with concentrations of 50,200 pCi/L in October 2002 and 43,800 pCi/L in March 2003. The tritium plot for well PW-11, illustrated in Figure 8, shows statistically significant, decreasing concentrations, with a correlation coefficient of 0.954 and slope of -23.48. The concentration in the March 2002 sample set a new historical low for PW-11. During the additional sampling round in June 2003, samples were collected from wells PW-12, and PW-13. Tritium was present in well PW-12 at concentrations of 2,400 pCi/L (2,270 pCi/L in the field duplicate), but was not present at detectable concentrations in well PW-13. The minimum detectable activity for tritium typically ranged from 280 to 300 pCi/L for the FY 2003 sampling.

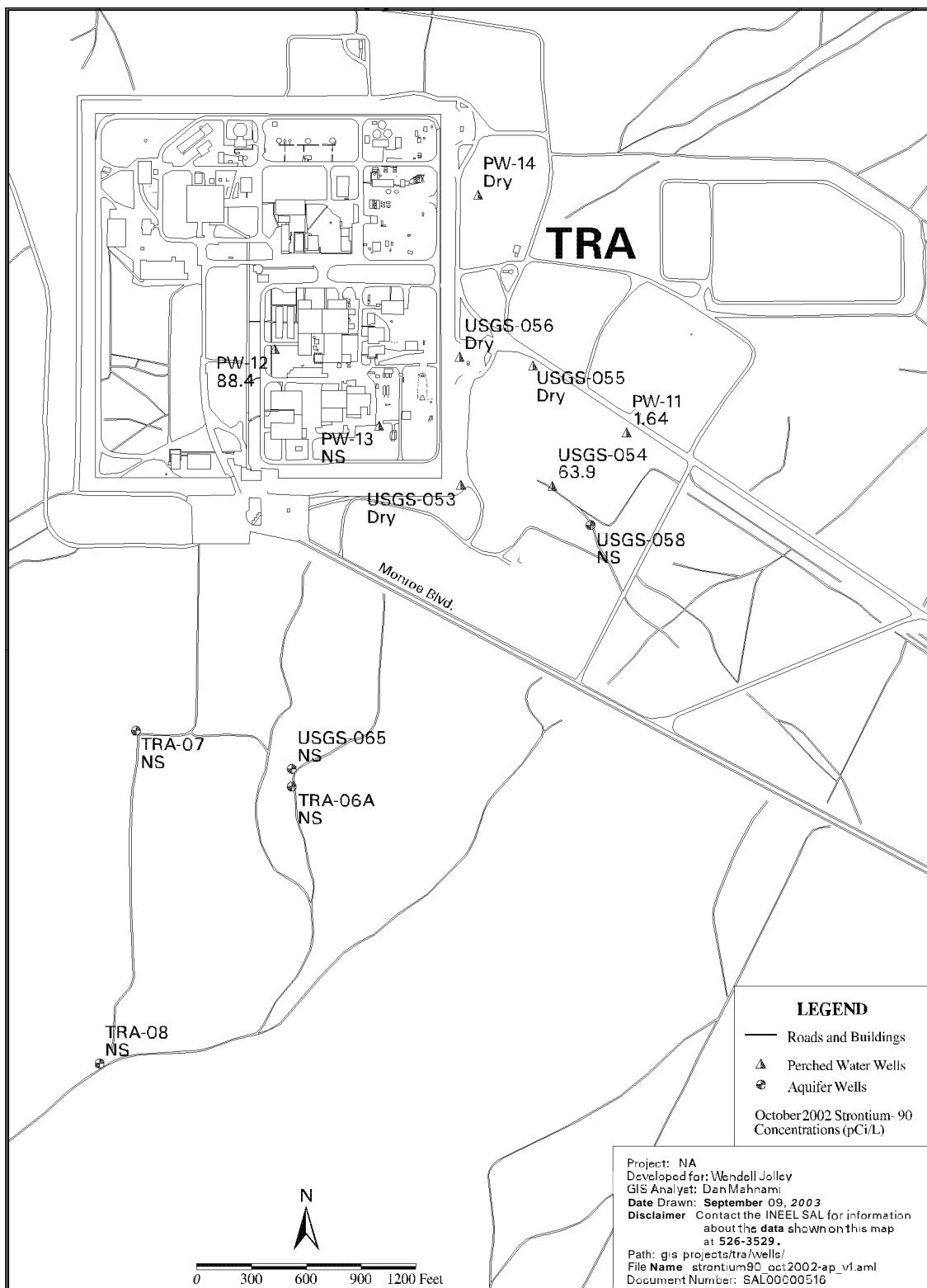


Figure 4. Strontium-90 concentrations from October 2002.

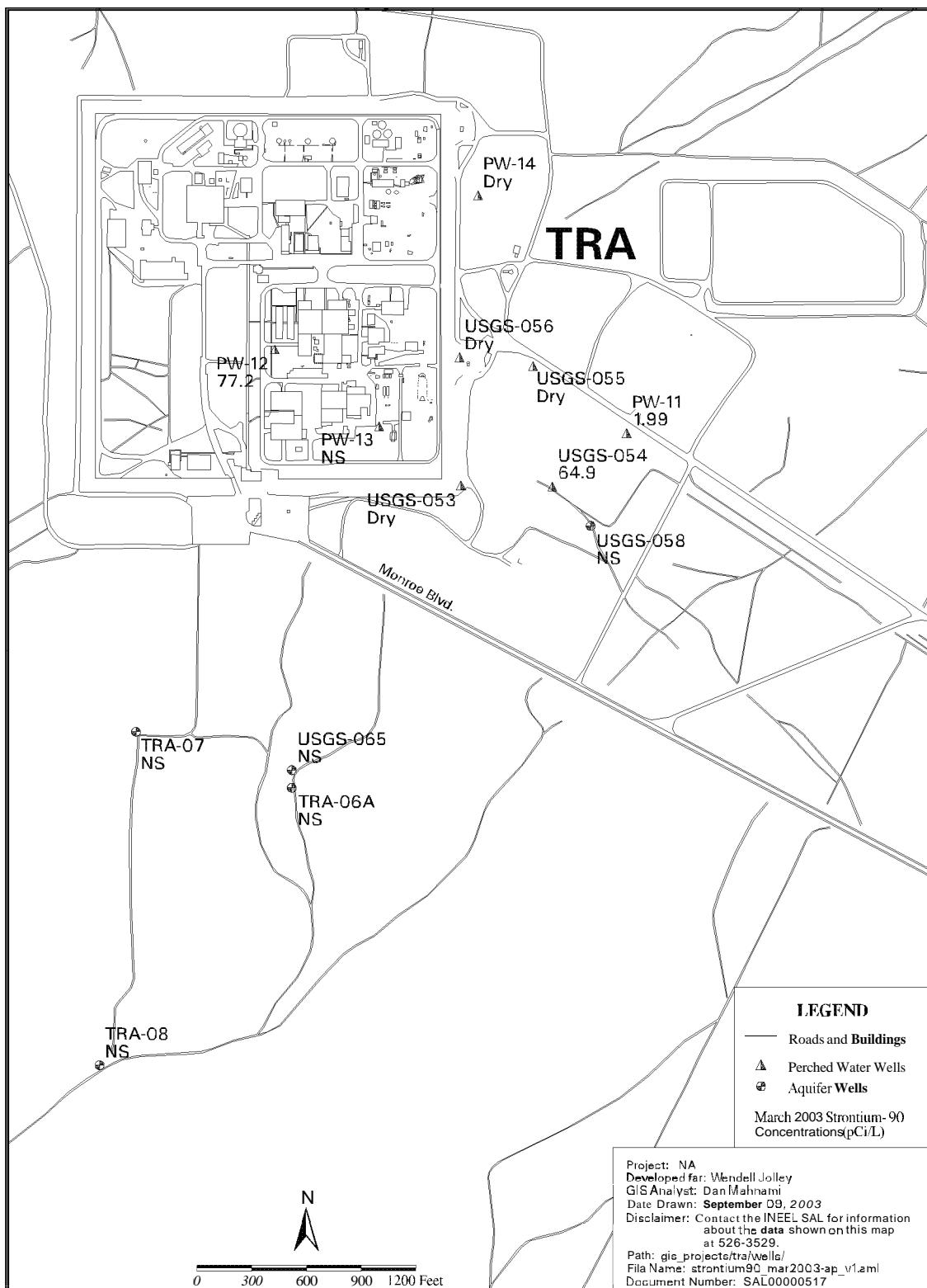


Figure 5. Strontium-90 concentrations from March 2003.

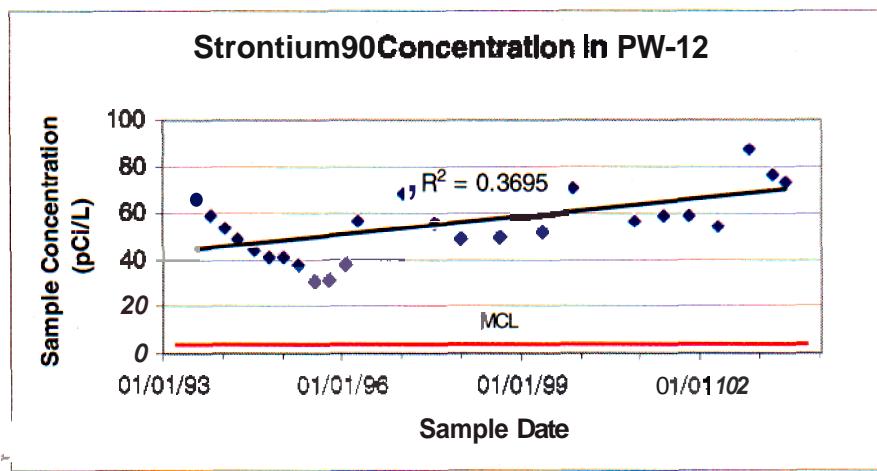


Figure 6. Strontium-90 in PW-12.

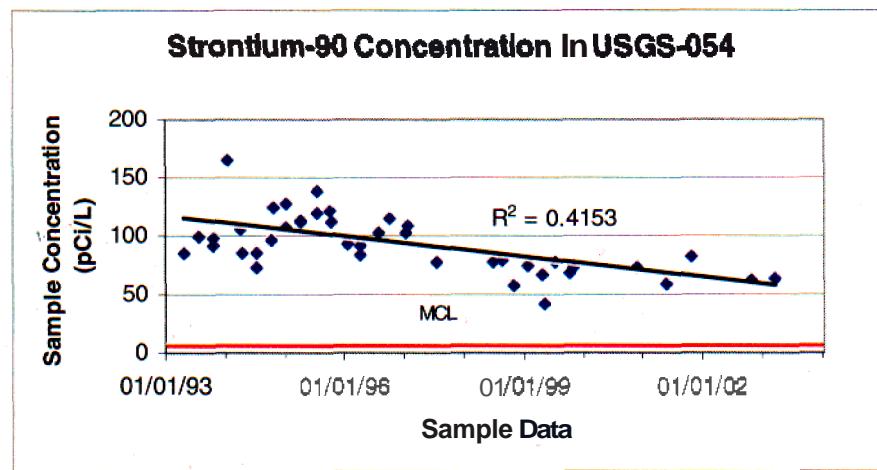


Figure 7. Strontium-90 in USGS-054.

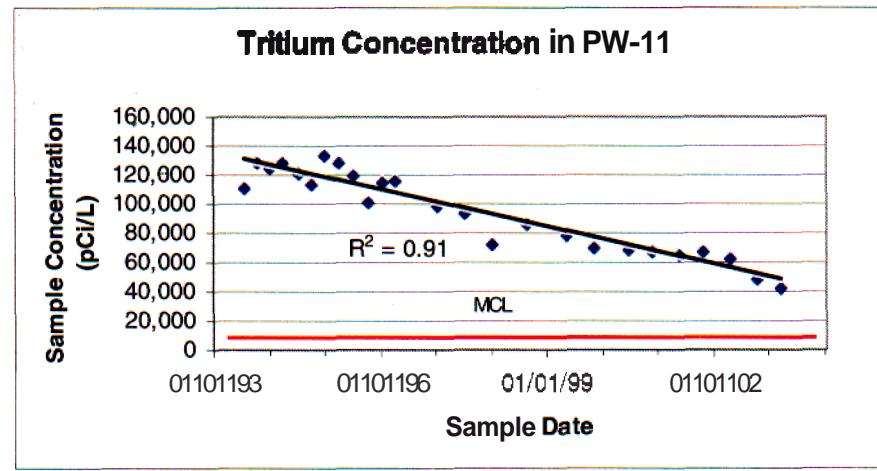


Figure 8. Tritium in PW-11.

2.2 Aquifer Welts

Groundwater samples were collected from aquifer water wells TRA-MA, TRA-07, TRA-08, USGS-056, USGS-058, and Highway-3. With the exception of well Highway-3, aquifer wells were analyzed for cadmium (Altered and unfiltered), chromium (filtered and unfiltered), and tritium. The individual constituents are summarized in the following subsections.

2.2.1 Cadmium

With the exception of two samples from the March 2003 sampling event, all cadmium concentrations were below the instrument detection limit. In March 2003, WAG 2 subcontracted the data analysis to a different laboratory that uses a lower instrument detection limit for cadmium; consequently, cadmium was detected in filtered and unfiltered samples from well USGS-058. Cadmium was detected in the filtered sample, with a concentration of 0.069 µg/L, and in the unfiltered sample, with a concentration of 0.063 µg/L. These concentrations are within the background concentration range at the INEEL and below the EPA-defined MCL of 5 µg/L.

2.2.2 Chromium

Chromium was present at detectable concentrations from all aquifer wells at WAG 2 during the FY 2003 sampling event. With the exception of well Highway-3, chromium concentrations were above background concentrations for all aquifer wells; however, the EPA-defined MCL of 100 µg/L was exceeded in wells TRA-07 and USGS-065. Analytical results for TRA-07 revealed chromium concentrations of 159 µg/L in October 2002 and 158 µg/L in March 2003, while results for well USGS-065 showed chromium concentrations of 134 µg/L in October 2002 and 118 µg/L in March 2003. Both wells appear to show a decreasing trend in chromium concentrations. Figures 9 and 10 show the chromium plots for wells TRA-07 and USGS-065.

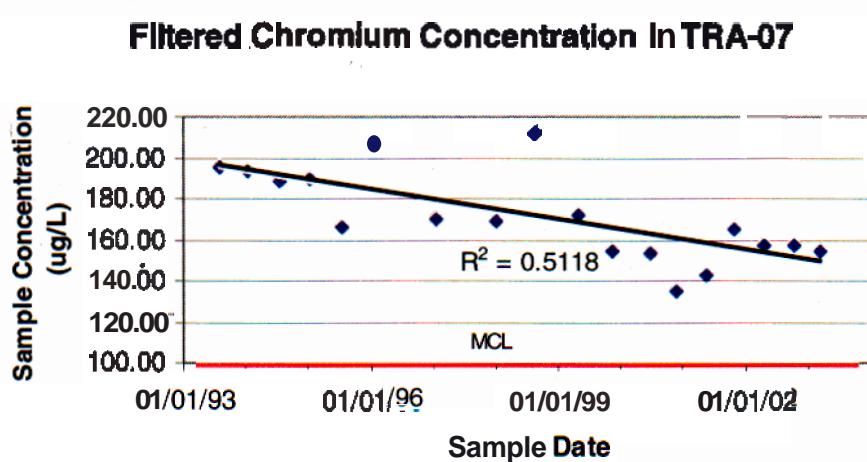


Figure 9. Chromium in TRA-07.

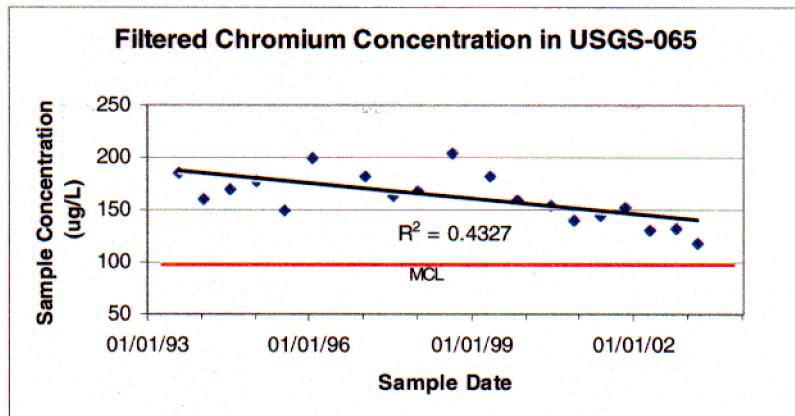


Figure 10. Chromium in USGS-065.

2.2.3 Tritium

Tritium was present in all of the aquifer wells sampled but at concentrations below the 20,000 pCi/L MCL. Figures 11 and 12 show tritium concentrations in the perched and aquifer wells for October 2002 and March 2003.

2.3 Interface Probe Monitoring

On June 9, 2003, well PW-13 was monitored using an interface probe to determine the presence and thickness of a floating organic layer in the water table. Product was encountered 74.4 ft below the top of the casing, and water was encountered at 75.3 ft below the top of the casing, indicating approximately 0.9 ft of product. Monitoring at PW-13 will continue in order to check for the presence and thickness of this organic layer.

2.4 Water Level Measurements

In addition to the groundwater sampling, water level measurements were obtained from 15 wells at WAG 2 to determine the direction of groundwater flow. Water level measurement data were used to generate the groundwater contour maps shown in Figures 13 and 14. Figure 13 shows groundwater contours plotted using a 2-ft contour interval, and Figure 14 uses the same data to generate a map with contours plotted on a 1-ft contour interval. Consistent with past groundwater contour maps of WAG 2, both maps show that the groundwater beneath WAG 2 generally flows to the southwest. However, as illustrated in Figure 14, when using the smaller contour interval, the map reveals unusual and unlikely features. The anomalous groundwater features represented on Figure 14 are probably the result of either inaccurate survey data or borehole deviation effects. Either of these factors could result in the unlikely contours presented in Figure 14. Therefore, measuring point and land surface should be re-surveyed at each of the WAG 2 wells to confirm these results.

Groundwater elevations were determined by subtracting depth to water measurements from surveyed elevation data and then correcting for borehole deviation in wells with established correction factors. Correction factors are based on gyroscopic and/or magnetic borehole deviation surveys. Borehole deviation logs are available for nine of the 15 wells on the contour maps. The six wells that do not have borehole deviation logs are Site -19 and USGS-058, -065, -076, -079, and -099. The WAG 2 water level measurement data from October 2002 are presented in Table 3.

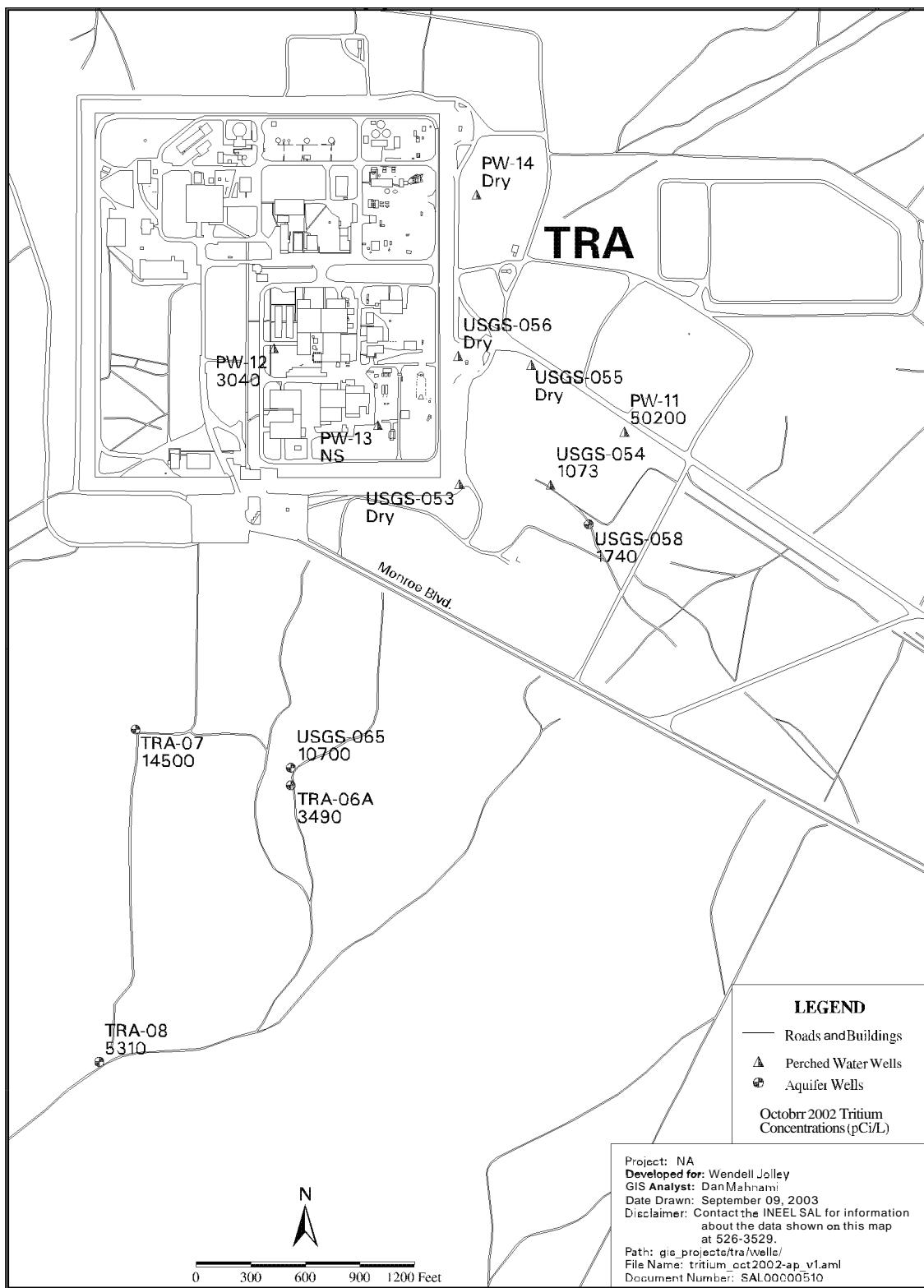
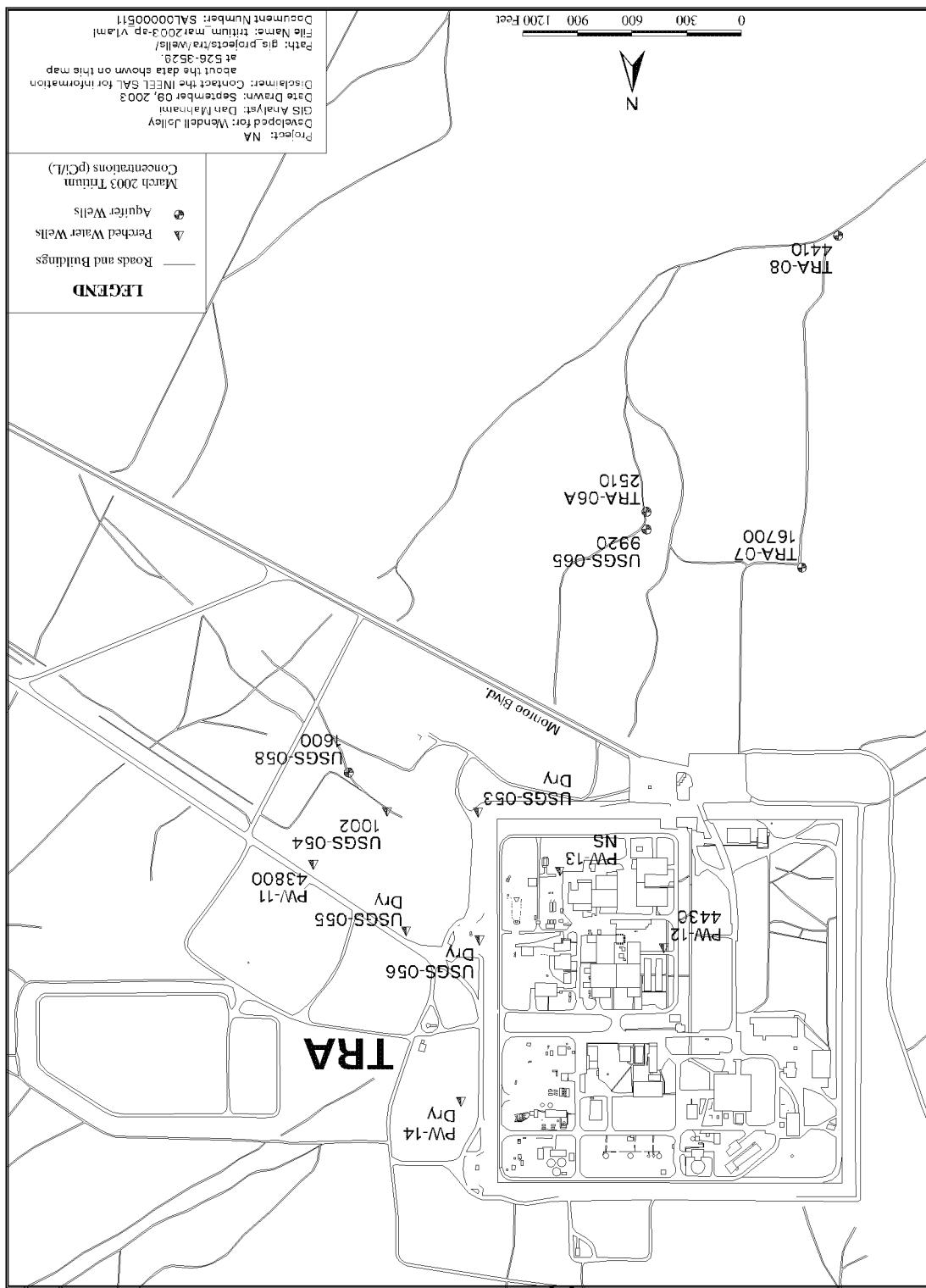


Figure 11. Tritium concentrations from October 2002

Figure 12. Tritium concentrations from March 2003.



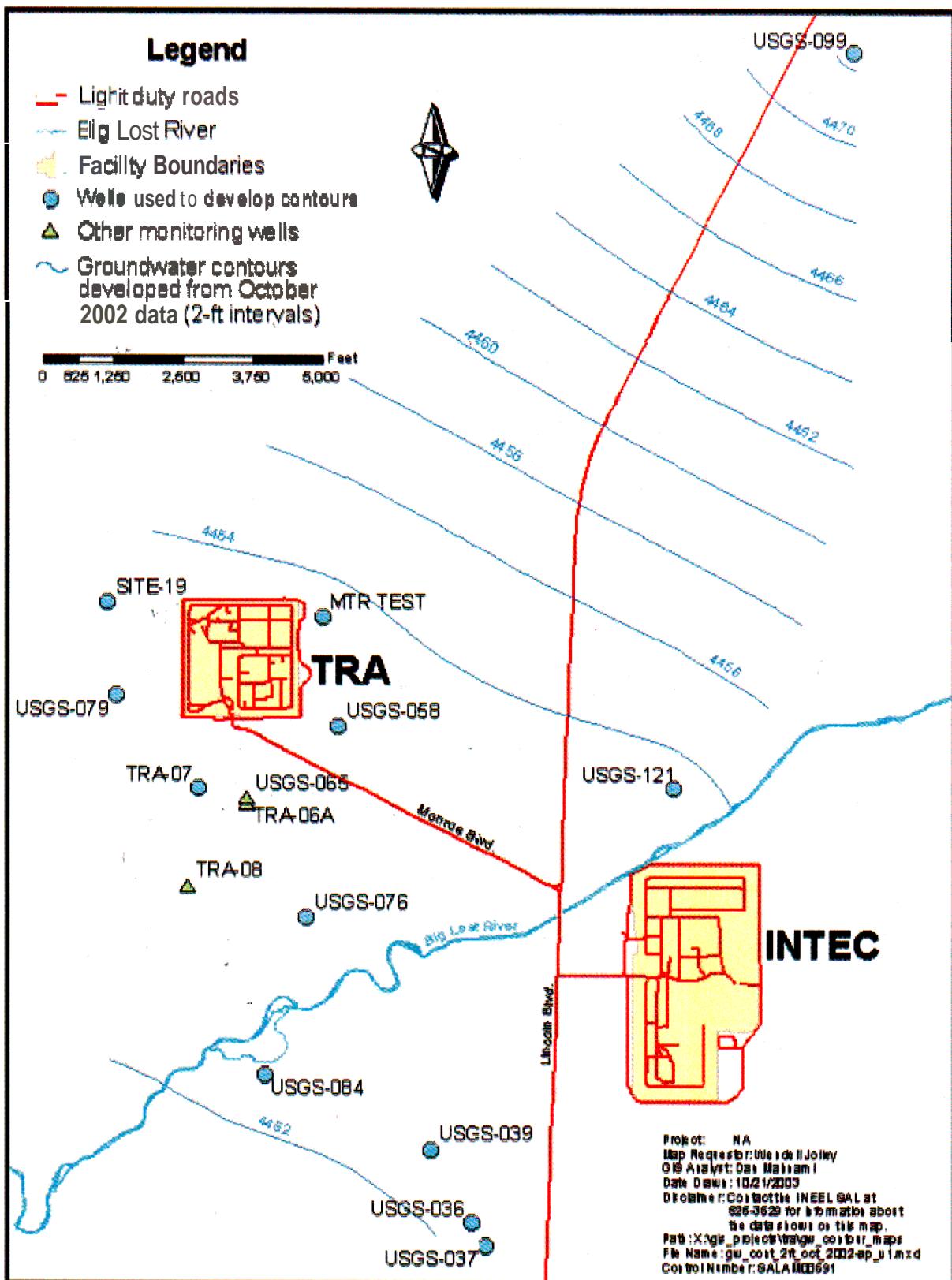


Figure 13. WAG 2 groundwater contours with 2-ft contour interval.

Figure 14. WAG 2 groundwater contours with 1-ft contour interval.

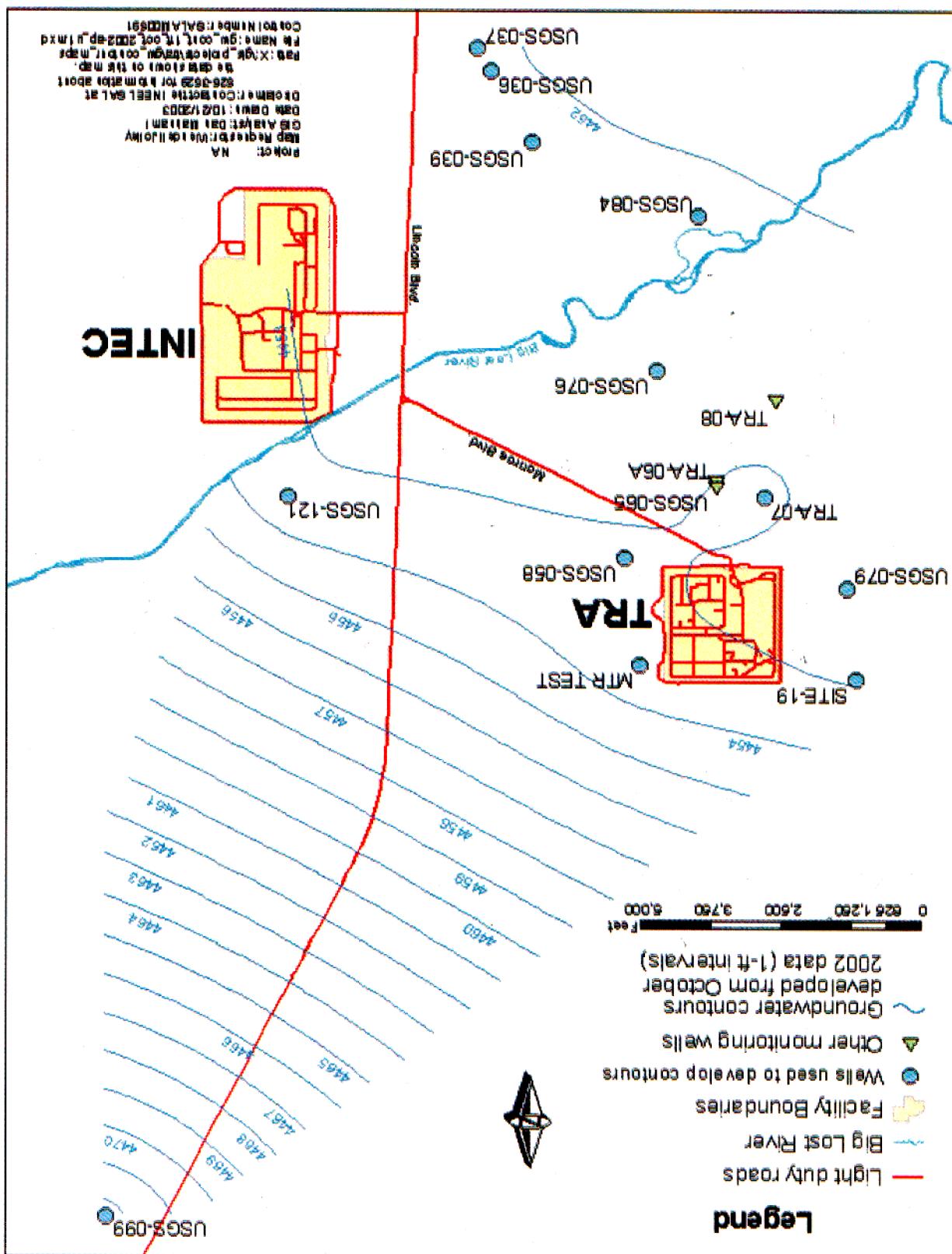


Table 3. WAG 2 groundwater level measurement data from October 2002.

Well	Well ID	Date Measured	Depth to Water (ft below land surface)	Land Surface Elevation	Correction Factor	Water Elevation (ft)
MTR-Test	231	10/07/02	463.92	4917.15	0.02	4453.25
SITE-19	279	10/07/02	473.43	4926.33		4452.90
TRA-06A	763	10/07/02	474.67	4925.60	0.19	4451.12
TRA-07	731	10/07/02	478.79	4931.56	0.49	4453.26
TRA-08	732	10/07/02	483.15	4934.93	2.1	4453.88
USGS-036	485	10/01/02	477.20	4929.20	0.05	4452.04
USGS-037	486	10/01/02	477.33	4929.38	0.05	4452.10
USGS-039	488	10/01/02	478.91	4930.95	0.09	4452.13
USGS-058	507	10/07/02	465.25	4918.37	—	4453.13
USGS-065	514	10/07/02	469.94	4925.01	—	4455.07
USGS-076	525	10/08/02	477.45	4929.70	—	4452.25
USGS-079	528	10/08/02	478.87	4931.08	—	4452.21
USGS-084	533	10/08/02	485.87	4937.90	0.01	4452.04
USGS-099	548	10/17/02	399.94	4872.36	—	4472.41
USGS-121	570	10/28/02	458.13	4909.65	1.73	4453.25

3. GROUNDWATER QUALITY

Overall quality of the groundwater underlying WAG 2 is determined by comparing the analytical data to the MCLs, as defined by the EPA. Table 4 summarizes the minimum, maximum, and average results from the FY 2003 sampling round. This table also shows the background concentrations at the INEEL for the identified analytes. Results are presented only for the analytes that had at least one true positive detection. However, nondetections were calculated into the average by using a value of one-half of the detection limit for the sample concentration. Chromium, cobalt-60, radium-226, strontium-90, and tritium were detected at concentrations above background concentrations and EPA-defined MCLs. Overall quality assurance and control of the sample results are discussed in Appendix B.

4. RECOMMENDATIONS

Continued groundwater monitoring is recommended at the prescribed frequency at wells currently identified in the WAG 2 groundwater monitoring plan (DOE-ID 2003a).

For overall comparability of the groundwater analytical data, continued collection of groundwater samples for WAG 2 is also recommended at approximately the same time of year for each annual event. WAG 2 groundwater sampling is currently scheduled for October and March each year.

In addition, the elevation of the brass marker and water level measuring point should be surveyed at each of the WAG 2 wells to confirm the accuracy of the calculated water table elevations. Furthermore, gyroscopic borehole deviation logs should be collected during scheduled well maintenance activities at all WAG 2 wells that do not currently have gyroscopic survey logs.

Table 4. WAG 5 groundwater quality summary.

Analyte	Background ^a	Maximum	Minimum	Average including Nondetects ^b	Number of Wells with Detections above MCL	Number of Samples	MCL
Perched water wells							
Cadmium Filtered	<1	ND	ND	0.20	0	8	5 µg/L
Cadmium Unfiltered		ND	ND	0.20	0	8	5 µg/L
Chromium Filtered	2 to 3	47.6	ND	15.9	0	8	100 µg/l
Chromium Unfiltered		44.4	ND	17.2	0	8	100 µg/l
Cobalt-60	0	330.0	ND	70.0	1	11	200 pCiL
Radium-226	0	54.9	ND	14.1	3	11	5 pCi/L ^c
Strontium-90	0	88.4	1.6	54.2	3	11	8 pCiL
Tritium	75 to 150	50,200	ND	9280	1	12	20,000 pCiL
Aquifer wells							
Cadmium Filtered	<1	0.07	ND	0.21	0	10	5 µg/L
Cadmium Unfiltered		0.06	ND	0.21	0	10	5 µg/L
Chromium Filtered	2 to 3	159	ND	59.8	2	12	100 µg/l
Chromium Unfiltered		167	ND	60.7	2	12	100 µg/l
Tritium	75 to 150	16700	1600	6988	0	10	20,000 pCiL

a. Background concentrations are from Knobel, Orr, and Cecil (1992).

b. Nondetections (ND) were calculated into the average using a value of 1/2 of the detection limit

c. Represents MCL for radium-226, and 228 combined.

5. REFERENCES

DOE-ID, 1992, *Record of Decision for the Test Reactor Area Perched Water System, Operable Unit 2-12*, U.S. Department of Energy Idaho Operations Office, December 1992.

DOE-ID, 1997, *Final Record of Decision for Test Reactor Area for Operable Unit 2-13 at Idaho National Engineering and Environmental Laboratory*, DOE/ID-10586, U.S. Department of Energy Idaho Operations Office, December 1997.

DOE-ID, 2003a, *Groundwater Monitoring Plan for the Test Reactor Area Operable Unit 2-13*, DOE/ID-10626, Rev. 2, U.S. Department of Energy Idaho Operations Office, February 2003

DOE-ID, 2003b, *First Five-Year Review Report for the Test Reactor Area, Operable Unit 2-13, at the Idaho National Engineering and Environmental Laboratory*, DOE/ID-11091, Rev. 0, U.S. Department of Energy Idaho Operations Office, September 2003.

INEEL, 2002, *Idaho National Engineering and Environmental Laboratory Sample Management Office Statement of Work for Analytical Services*, ER-SOW-394, Rev. 0, December 2002.

Knobel, L. L., B. R. Orr, and L. D. Cecil, 1992, "Summary of Background Concentrations of Selected Radiochemical and Chemical Constituents in Groundwater from the Snake River Plain Aquifer Idaho: Estimated from an Analysis of Previously Published Data," *Journal of the Idaho Academy of Science*, Vol. 28, No. 1, 1992.

Appendix A

Analytical Results

A²

Appendix A

Analytical Results

This appendix presents the analytical data collected from groundwater sampling at Waste Area Group 2. (Data are also available on the CD in sleeve at back of report.) Data qualifier flags used in this appendix are defined as follows:

- Inorganic Analysis
- B Reported value was obtained from a reading that was less than the Contract Required Detection Limit but greater than or equal to the Instrument Detection Limit.
- U Analyte was analyzed for but not detected.
- E Reported value is estimated because of the presence of interferences.
- Rad Analysis
- U The analysis was performed, but no radioactivity was detected (i.e., the radioanalytical result was not statistically positive at the 95% confidence interval and/or the result is below its minimum detectable activity [MDA]). The “U” qualifier flag is also applicable to any result reported as zero (0) (\pm an associated uncertainty).

NOTE: *The radionuclide is not considered to be present in the sample.*

- UJ The analysis was performed and a statistically positive result was reported at the 95% confidence interval. However, the result is highly questionable (false positive) due to analytical and/or laboratory quality control anomalies. The use of such a result is strongly discouraged. Analytical and quality control anomalies include such items as significant blank contamination, known photopeak interferences and/or photopeak resolution problems, known matrix interferences, unacceptable laboratory control sample recoveries, serious instrument calibration problems, improper sample preservation, etc.

NOTE: *The radionuclide may or may not be present in the sample and the result is considered highly questionable.*

- J The analysis was performed and radioactivity was detected (i.e., the radionuclide result is statistically positive at the 95% confidence interval and is above its MDA). However, the result is questionable due to analytical and/or laboratory quality control anomalies/irregularities and should therefore be used only as an estimated (approximated) quantity. Analytical and/or quality control anomalies include such items as laboratory duplicate imprecision, unsatisfactory analytical yields, insufficient laboratory control sample recoveries, unacceptable PE sample results, instrument calibration problems, improper sample preservation, etc.

NOTE: *The radionuclide is considered to be present in the sample, however, the result may not be an accurate representation of the amount of activity actually present in the sample.*

Table A-1. Fiscal Year 2003 sample data.

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	LabFlags	ValFlags	Method Code	Depth
TRA04101R4	03/19/2003	Blank	Americium-241	-1.00E+00	pCi/L	6.27E+00	1.89E+01	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Americium-241	8.63E-01	pCi/L	7.67E+00	2.38E+01	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Americium-241	1.51E+01	pCi/L	5.78E+00	2.03E+01	—	UJ	GMS	NA
TRA02801R4	03/17/2003	PW-11	Americium-241	1.85E+01	pCi/L	1.01E+01	2.22E+01	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Americium-241	-8.98E+00	pCi/L	8.18E+00	2.57E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Americium-241	-8.44E+00	pCi/L	1.12E+01	3.25E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Americium-241	1.89E+01	pCi/L	9.99E+00	3.32E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Americium-241	6.08E+00	pCi/L	1.01E+01	3.18E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Americium-241	4.12E+00	pCi/L	2.09E+00	6.89E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Americium-241	-1.06E+00	pCi/L	2.69E+00	9.22E+00	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Americium-241	-5.67E+00	pCi/L	8.84E+00	2.63E+01	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Americium-241	-7.10E+00	pCi/L	3.19E+00	1.07E+01	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Americium-241	5.27E+00	pCi/L	5.16E+00	1.85E+01	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Americium-241	4.65E+00	pCi/L	6.83E+00	2.09E+01	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Americium-241	-4.76E+00	pCi/L	8.80E+00	3.08E+01	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Americium-241	-2.19E+00	pCi/L	8.94E+00	2.75E+01	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Americium-241	-6.68E+00	pCi/L	8.83E+00	2.75E+01	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Antimony-125	-3.16E+00	pCi/L	2.31E+00	7.91E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Antimony-125	1.17E+00	pCi/L	2.88E+00	1.13E+01	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Antimony-125	-2.74E+00	pCi/L	2.26E+00	7.81E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Antimony-125	-1.72E+00	pCi/L	2.53E+00	8.64E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Antimony-125	-9.79E-01	pCi/L	4.43E+00	1.61E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Antimony-125	1.96E-01	pCi/L	3.48E+00	1.24E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Antimony-125	5.00E+00	pCi/L	4.13E+00	1.60E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Antimony-125	-1.08E+00	pCi/L	4.62E+00	1.63E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Antimony-125	4.33E+00	pCi/L	2.90E+00	1.04E+01	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Antimony-125	-1.90E+00	pCi/L	3.92E+00	1.36E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Antimony-125	-1.89E+00	pCi/L	2.71E+00	7.87E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Antimony-125	-1.34E+00	pCi/L	1.63E+00	5.27E+00	—	U	GMS	NA

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
21321501R4	10/23/2002	Rinsate	Antimony-125	-3.40E-01	pCi/L	2.29E+00	8.17E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Antimony-125	-4.84E+00	pCi/L	4.06E+00	1.35E+01	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Antimony-125	-3.34E+00	pCi/L	3.18E+00	1.10E+01	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Antimony-125	3.29E+00	pCi/L	2.50E+00	9.06E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Antimony-125	2.77E+00	pCi/L	2.88E+00	1.08E+01	—	U	GMS	91
TRA041016C	03/19/2003	Blank	Cadmium	0.012	µg/L	—	—	B	U	E200.8	NA
TRA04101UC	03/19/2003	Blank	Cadmium	0.01	µg/L	—	—	B	U	E200.8	NA
21321401UC	10/10/2002	Blank	Cadmium	0.8	µg/L	—	—	U	—	E200.7	NA
213214016C	10/22/2002	Blank	Cadmium	0.8	µg/L	—	—	U	—	E200.7	NA
TRA028016C	03/17/2003	PW-11	Cadmium	0.008	µg/L	—	—	U	—	E200.8	134.5
TRA02801UC	03/17/2003	PW-11	Cadmium	0.028	µg/L	—	—	B	U	E200.8	134.5
213201016C	10/22/2002	PW-11	Cadmium	0.8	µg/L	—	—	UE	—	E200.7	134.5
21320101UC	10/22/2002	PW-11	Cadmium	0.8	µg/L	—	—	UE	—	E200.7	134.5
TRA029016C	03/17/2003	PW-12	Cadmium	0.008	µg/L	—	—	U	—	E200.8	133
TRA02901UC	03/17/2003	PW-12	Cadmium	0.01	µg/L	—	—	B	U	E200.8	133
21320201UC	10/23/2002	PW-12	Cadmium	0.8	µg/L	—	—	UE	—	E200.7	133
213220216C	10/23/2002	PW-12	Cadmium	0.8	µg/L	—	—	UE	—	E200.7	133
TRA042016C	03/19/2003	Rinsate	Cadmium	0.008	µg/L	—	—	U	—	E200.8	NA
TRA04201UC	03/19/2003	Rinsate	Cadmium	0.008	µg/L	—	—	U	—	E200.8	NA
213215016C	10/23/2002	Rinsate	Cadmium	0.8	µg/L	—	—	U	—	E200.7	NA
21321501UC	10/23/2002	Rinsate	Cadmium	0.8	µg/L	—	—	U	—	E200.7	NA
TRA035016C	03/11/2003	TRA-06A	Cadmium	0.008	µg/L	—	—	U	—	E200.8	562
TRA03501UC	03/11/2003	TRA-06A	Cadmium	0.017	µg/L	—	—	B	U	E200.8	562
213208016C	10/17/2002	TRA-06A	Cadmium	0.8	µg/L	—	—	U	—	E200.7	562
21320801UC	10/17/2002	TRA-06A	Cadmium	0.8	µg/L	—	—	U	—	E200.7	562
TRA036016C	03/12/2003	TRA-07	Cadmium	0.014	µg/L	—	—	B	U	E200.8	501
TRA03601UC	03/12/2003	TRA-07	Cadmium	0.018	µg/L	—	—	B	U	E200.8	501
213209016C	10/16/2002	TRA-07	Cadmium	0.8	µg/L	—	—	U	—	E200.7	501
21320901UC	10/16/2002	TRA-07	Cadmium	0.8	µg/L	—	—	U	—	E200.7	501

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA037016C	03/12/2003	TRA-08	Cadmium	0.008	µg/L	—	—	B	U	E200.8	501.5
TRA03701UC	03/12/2003	TRA-08	Cadmium	0.015	µg/L	—	—	B	U	E200.8	501.5
213210016C	10/22/2002	TRA-08	Cadmium	0.8	µg/L	—	—	U	—	E200.7	501.5
21321001UC	10/22/2002	TRA-08	Cadmium	0.8	µg/L	—	—	U	—	E200.7	501.5
TRA032016C	03/19/2003	USGS-054	Cadmium	0.034	µg/L	—	—	B	U	E200.8	91
TRA03201UC	03/19/2003	USGS-054	Cadmium	0.019	µg/L	—	—	B	U	E200.8	91
TRA032026C	03/19/2003	USGS-054	Cadmium	0.013	µg/L	—	—	B	U	E200.8	91
TRA03202UC	03/19/2003	USGS-054	Cadmium	0.036	µg/L	—	—	B	U	E200.8	91
213205016C	10/23/2002	USGS-054	Cadmium	0.8	µg/L	—	—	U	—	E200.7	91
21320501UC	10/23/2002	USGS-054	Cadmium	0.8	µg/L	—	—	UE	—	E200.7	91
213205026C	10/23/2002	USGS-054	Cadmium	0.8	µg/L	—	—	U	—	E200.7	91
21320502UC	10/23/2002	USGS-054	Cadmium	0.8	µg/L	—	—	U	—	E200.7	91
TRA038016C	03/11/2003	USGS-058	Cadmium	0.069	µg/L	—	—	B	—	E200.8	503
TRA03801UC	03/11/2003	USGS-058	Cadmium	0.063	µg/L	—	—	B	—	E200.8	503
213211016C	10/21/2002	USGS-058	Cadmium	0.8	µg/L	—	—	U	—	E200.7	503
21321101UC	10/21/2002	USGS-058	Cadmium	0.8	µg/L	—	—	U	—	E200.7	503
TRA039016C	03/19/2003	USGS-065	Cadmium	0.008	µg/L	—	—	U	—	E200.8	498
TRA03901UC	03/19/2003	USGS-065	Cadmium	0.057	µg/L	—	—	B	U	E200.8	498
213212016C	10/22/2002	USGS-065	Cadmium	0.8	µg/L	—	—	U	—	E200.7	498
21321201UC	10/22/2002	USGS-065	Cadmium	0.8	µg/L	—	—	U	—	E200.7	498
TRA04101R4	03/19/2003	Blank	Cerium-144	1.47E+01	pCi/L	5.99E+00	2.21E+01	—	UJ	GMS	NA
TRA05501R4	06/09/2003	Blank	Cerium-144	-2.73E-02	pCi/L	8.47E+00	3.03E+01	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Cerium-144	4.16E+00	pCi/L	5.89E+00	2.11E+01	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Cerium-144	4.02E+00	pCi/L	7.33E+00	2.50E+01	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Cerium-144	-4.64E+00	pCi/L	9.82E+00	3.41E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Cerium-144	-6.43E+00	pCi/L	8.20E+00	2.80E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Cerium-144	-9.56E+00	pCi/L	1.04E+01	3.57E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Cerium-144	4.43E+00	pCi/L	1.17E+01	3.98E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Cerium-144	-4.12E+00	pCi/L	6.41E+00	2.04E+01	—	U	GMS	133

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA05401R4	06/09/2003	PW-13	Cerium-144	6.09E+00	pCi/L	8.67E+00	2.80E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Cerium-144	-3.94E+00	pCi/L	5.58E+00	1.94E+01	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Cerium-144	-5.48E+00	pCi/L	4.09E+00	1.37E+01	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Cerium-144	3.79E+00	pCi/L	6.52E+00	2.25E+01	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Cerium-144	-2.78E+00	pCi/L	9.85E+00	3.22E+01	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Cerium-144	-6.90E-01	pCi/L	9.13E+00	3.13E+01	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Cerium-144	6.13E+00	pCi/L	5.75E+00	2.11E+01	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Cerium-144	-3.26E+00	pCi/L	8.05E+00	2.75E+01	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Cesium-134	1.80E+00	pCi/L	7.99E-01	2.96E+00	—	UJ	GMS	NA
TRA05501R4	06/09/2003	Blank	Cesium-134	-1.93E+00	pCi/L	1.25E+00	4.15E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Cesium-134	5.72E-01	pCi/L	9.21E-01	3.03E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Cesium-134	-2.54E-01	pCi/L	1.49E+00	3.16E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Cesium-134	-5.27E-01	pCi/L	1.62E+00	5.76E+00	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Cesium-134	2.49E-01	pCi/L	1.49E+00	4.63E+00	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Cesium-134	-1.73E+00	pCi/L	1.59E+00	5.41E+00	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Cesium-134	-1.43E+00	pCi/L	2.08E+00	6.10E+00	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Cesium-134	-7.19E-01	pCi/L	9.87E-01	3.43E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Cesium-134	4.50E+00	pCi/L	2.08E+00	5.83E+00	—	UJ	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Cesium-134	-9.29E-01	pCi/L	8.62E-01	2.55E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Cesium-134	2.23E-01	pCi/L	5.32E-01	1.91E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Cesium-134	-4.57E-01	pCi/L	8.55E-01	2.94E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Cesium-134	-2.52E-01	pCi/L	1.43E+00	4.29E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Cesium-134	-1.13E+00	pCi/L	1.27E+00	3.72E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Cesium-134	0.00E+00	pCi/L	1.66E+00	3.13E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Cesium-134	-6.10E-01	pCi/L	1.20E+00	3.63E+00	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Cesium-137	-3.76E-01	pCi/L	8.44E-01	2.98E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Cesium-137	4.54E-01	pCi/L	1.15E+00	4.52E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Cesium-137	-2.62E-02	pCi/L	8.80E-01	3.18E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Cesium-137	-5.43E-01	pCi/L	1.09E+00	3.20E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Cesium-137	-6.03E-01	pCi/L	1.85E+00	6.56E+00	—	U	GMS	134.5

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA02901R4	03/17/2003	PW-12	Cesium-137	1.75E+00	pCi/L	1.49E+00	5.41E+00	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Cesium-137	2.72E+00	pCi/L	1.60E+00	5.97E+00	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Cesium-137	1.70E+00	pCi/L	1.81E+00	6.74E+00	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Cesium-137	-1.28E+00	pCi/L	1.19E+00	4.03E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Cesium-137	-6.02E-01	pCi/L	1.66E+00	6.15E+00	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Cesium-137	2.26E+00	pCi/L	1.07E+00	4.14E+00	—	UJ	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Cesium-137	8.84E-01	pCi/L	5.73E-01	2.15E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Cesium-137	5.42E-01	pCi/L	9.01E-01	3.30E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Cesium-137	5.55E-01	pCi/L	3.60E+00	5.08E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Cesium-137	6.87E-01	pCi/L	1.07E+00	4.01E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Cesium-137	2.49E+00	pCi/L	1.20E+00	4.20E+00	—	UJ	GMS	91
21320502R4	10/23/2002	USGS-054	Cesium-137	1.01E+00	pCi/L	1.04E+00	3.98E+00	—	U	GMS	91
TRA041015C	03/19/2003	Blank	Chromium	1.37	µg/L	—	—	U	—	E200.7	NA
TRA04101CU	03/19/2003	Blank	Chromium	1.37	µg/L	—	—	U	—	E200.7	NA
213214015C	10/22/2002	Blank	Chromium	0.9	µg/L	—	—	U	—	E200.7	NA
21321401CU	10/22/2002	Blank	Chromium	0.9	µg/L	—	—	U	—	E200.7	NA
TRA040015C	03/11/2003	HWY-3	Chromium	2.11	µg/L	—	—	B	U	E200.7	750
TRA04001CU	03/11/2003	HWY-3	Chromium	2.14	µg/L	—	—	B	U	E200.7	750
213213015C	10/16/2002	HWY-3	Chromium	1.2	µg/L	—	—	B	—	E200.7	750
21321301CU	10/16/2002	HWY-3	Chromium	1.4	µg/L	—	—	B	—	E200.7	750
TRA02801CU	03/17/2003	PW-11	Chromium	36.9	µg/L	—	—	—	—	E200.7	134.5
TRA028015C	03/19/2003	PW-11	Chromium	43.3	µg/L	—	—	—	—	E200.7	134.5
213201015C	10/22/2002	PW-11	Chromium	44.4	µg/L	—	—	—	—	E200.7	134.5
21320101CU	10/22/2002	PW-11	Chromium	47.6	µg/L	—	—	—	—	E200.7	134.5
TRA02901CU	03/17/2003	PW-12	Chromium	2.96	µg/L	—	—	B	U	E200.7	133
TRA029015C	03/19/2003	PW-12	Chromium	5.09	µg/L	—	—	B	U	E200.7	133
213202015C	10/23/2002	PW-12	Chromium	7.9	µg/L	—	—	B	—	E200.7	133
21320201CU	10/23/2002	PW-12	Chromium	3.2	µg/L	—	—	B	—	E200.7	133
TRA042015C	03/19/2003	Rinsate	Chromium	1.37	µg/L	—	—	U	—	E200.7	NA

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA04201CU	03/19/2003	Rinsate	Chromium	1.37	µg/L	—	—	U	—	E200.7	NA
213215015C	10/23/2002	Rinsate	Chromium	0.9	µg/L	—	—	U	—	E200.7	NA
21321501CU	10/23/2002	Rinsate	Chromium	0.9	µg/L	—	—	U	—	E200.7	NA
TRA035015C	03/11/2003	TRA-06A	Chromium	9.74	µg/L	—	—	B	—	E200.7	562
TRA03501CU	03/11/2003	TRA-06A	Chromium	9.55	µg/L	—	—	B	—	E200.7	562
213208015C	10/17/2002	TRA-06A	Chromium	8.2	µg/L	—	—	B	—	E200.7	562
21320801CU	10/17/2002	TRA-06A	Chromium	8.3	µg/L	—	—	B	—	E200.7	562
TRA036015C	03/12/2003	TRA-07	Chromium	157	µg/L	—	—	—	—	E200.7	501
TRA03601CU	03/12/2003	TRA-07	Chromium	158	µg/L	—	—	—	—	E200.7	501
213209015C	10/16/2002	TRA-07	Chromium	167	µg/L	—	—	—	—	E200.7	501
21320901CU	10/16/2002	TRA-07	Chromium	159	µg/L	—	—	—	—	E200.7	501
TRA037015C	03/12/2003	TRA-08	Chromium	49.9	µg/L	—	—	—	—	E200.7	501.5
TRA03701CU	03/12/2003	TRA-08	Chromium	46.3	µg/L	—	—	—	—	E200.7	501.5
213210015C	10/22/2002	TRA-08	Chromium	58.8	µg/L	—	—	—	—	E200.7	501.5
21321001CU	10/22/2002	TRA-08	Chromium	57.1	µg/L	—	—	—	—	E200.7	501.5
TRA032015C	03/19/2003	USGS-054	Chromium	10.1	µg/L	—	—	—	—	E200.7	91
TRA03201CU	03/19/2003	USGS-054	Chromium	9.7	µg/L	—	—	B	—	E200.7	91
TRA032025C	03/19/2003	USGS-054	Chromium	9.35	µg/L	—	—	B	—	E200.7	91
TRA03202CU	03/19/2003	USGS-054	Chromium	9.21	µg/L	—	—	B	—	E200.7	91
213205015C	10/23/2002	USGS-054	Chromium	10	µg/L	—	—	B	—	E200.7	91
21320501CU	10/23/2002	USGS-054	Chromium	9.2	µg/L	—	—	B	—	E200.7	91
213205025C	10/23/2002	USGS-054	Chromium	10.2	µg/L	—	—	—	—	E200.7	91
21320502CU	10/23/2002	USGS-054	Chromium	9.7	µg/L	—	—	B	—	E200.7	91
TRA038015C	03/11/2003	USGS-058	Chromium	10.9	µg/L	—	—	—	—	E200.7	503
TRA03801CU	03/11/2003	USGS-058	Chromium	13.1	µg/L	—	—	—	—	E200.7	503
213211015C	10/21/2002	USGS-058	Chromium	11.4	µg/L	—	—	—	—	E200.7	503
21321101CU	10/21/2002	USGS-058	Chromium	11.4	µg/L	—	—	—	—	E200.7	503
TRA039015C	03/19/2003	USGS-065	Chromium	122	µg/L	—	—	—	—	E200.7	498
TRA03901CU	03/19/2003	USGS-065	Chromium	118	µg/L	—	—	—	—	E200.7	498

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Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
213212015C	10/22/2002	USGS-065	Chromium	131	µg/L	—	—	—	—	E200.7	498
21321201CU	10/22/2002	USGS-065	Chromium	134	µg/L	—	—	—	—	E200.7	498
TRA04101R4	03/19/2003	Blank	Cobalt-58	7.48E-02	pCi/L	8.69E-01	3.14E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Cobalt-58	6.65E-01	pCi/L	1.36E+00	5.34E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Cobalt-58	8.16E-01	pCi/L	1.15E+00	2.84E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Cobalt-58	1.26E+00	pCi/L	9.29E-01	3.64E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Cobalt-58	-6.62E-01	pCi/L	1.60E+00	5.71E+00	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Cobalt-58	3.75E+00	pCi/L	1.78E+00	6.48E+00	—	UJ	GMS	133
TRA05301R4	06/09/2003	PW-12	Cobalt-58	-2.16E+00	pCi/L	2.04E+00	6.80E+00	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Cobalt-58	1.73E+00	pCi/L	2.04E+00	7.53E+00	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Cobalt-58	-1.25E+00	pCi/L	1.40E+00	4.72E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Cobalt-58	8.08E-01	pCi/L	1.88E+00	7.27E+00	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Cobalt-58	-1.54E+00	pCi/L	8.02E-01	2.53E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Cobalt-58	-6.48E-01	pCi/L	6.21E-01	2.09E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Cobalt-58	-3.39E-01	pCi/L	9.89E-01	3.41E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Cobalt-58	-1.56E-02	pCi/L	1.41E+00	5.14E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Cobalt-58	8.41E-01	pCi/L	1.22E+00	4.07E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Cobalt-58	1.15E+00	pCi/L	8.40E-01	3.30E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Cobalt-58	-6.32E-01	pCi/L	1.18E+00	4.08E+00	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Cobalt-60	7.97E-02	pCi/L	9.15E-01	3.48E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Cobalt-60	-3.45E-01	pCi/L	1.71E+00	5.69E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Cobalt-60	-1.00E+00	pCi/L	1.05E+00	3.64E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Cobalt-60	3.51E+00	pCi/L	2.03E+00	3.22E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Cobalt-60	3.39E+00	pCi/L	2.29E+00	9.33E+00	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Cobalt-60	3.30E+02	pCi/L	1.79E+01	4.40E+00	—	—	GMS	133
TRA05301R4	06/09/2003	PW-12	Cobalt-60	1.61E+02	pCi/L	1.08E+01	6.55E+00	—	—	GMS	133
TRA05302R4	06/09/2003	PW-12	Cobalt-60	1.74E+02	pCi/L	1.14E+01	4.79E+00	—	—	GMS	133
21320201R4	10/23/2002	PW-12	Cobalt-60	9.82E+01	pCi/L	6.77E+00	3.54E+00	—	—	GMS	133
TRA05401R4	06/09/2003	PW-13	Cobalt-60	4.10E-01	pCi/L	1.79E+00	7.24E+00	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Cobalt-60	-1.23E-01	pCi/L	8.79E-01	3.31E+00	—	U	GMS	NA

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA05601R4	06/09/2003	Rinsate	Cobalt-60	-3.61E-01	pCi/L	5.73E-01	2.05E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Cobalt-60	1.05E+00	pCi/L	9.27E-01	3.71E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Cobalt-60	-9.32E-01	pCi/L	1.40E+00	4.89E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Cobalt-60	1.76E+00	pCi/L	1.20E+00	4.93E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Cobalt-60	2.75E+00	pCi/L	1.21E+00	3.78E+00	—	UJ	GMS	91
21320502R4	10/23/2002	USGS-054	Cobalt-60	1.18E+00	pCi/L	1.00E+00	4.21E+00	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Europium-152	-2.05E+00	pCi/L	2.73E+00	9.00E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Europium-152	6.49E+00	pCi/L	3.60E+00	1.40E+01	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Europium-152	-2.22E+00	pCi/L	2.64E+00	8.68E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Europium-152	-9.61E-01	pCi/L	2.69E+00	9.41E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Europium-152	-4.16E+00	pCi/L	6.16E+00	1.79E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Europium-152	-5.26E+00	pCi/L	3.85E+00	1.23E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Europium-152	-9.98E-01	pCi/L	4.75E+00	1.62E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Europium-152	6.06E+00	pCi/L	4.82E+00	1.79E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Europium-152	-5.43E-01	pCi/L	2.99E+00	1.02E+01	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Europium-152	-8.54E+00	pCi/L	3.99E+00	1.25E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Europium-152	-2.74E+00	pCi/L	2.65E+00	8.70E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Europium-152	8.83E-01	pCi/L	1.62E+00	5.55E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Europium-152	5.21E+00	pCi/L	2.77E+00	1.05E+01	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Europium-152	6.47E-01	pCi/L	4.11E+00	1.44E+01	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Europium-152	3.23E-01	pCi/L	3.58E+00	1.21E+01	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Europium-152	1.86E+00	pCi/L	2.72E+00	9.61E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Europium-152	3.78E-01	pCi/L	3.34E+00	1.14E+01	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Europium-154	4.33E+00	pCi/L	2.53E+00	1.07E+01	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Europium-154	8.46E+00	pCi/L	3.14E+00	1.63E+01	—	UJ	GMS	NA
21321401R4	10/22/2002	Blank	Europium-154	-3.43E+00	pCi/L	2.46E+00	8.21E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Europium-154	0.00E+00	pCi/L	5.73E+00	1.13E+01	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Europium-154	9.28E-02	pCi/L	4.83E+00	1.87E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Europium-154	-5.58E+00	pCi/L	3.65E+00	1.22E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Europium-154	-4.47E+00	pCi/L	4.09E+00	1.42E+01	—	U	GMS	133

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Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA05302R4	06/09/2003	PW-12	Europium-154	-2.09E+00	pCi/L	3.56E+00	1.32E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Europium-154	-3.10E+00	pCi/L	2.96E+00	1.02E+01	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Europium-154	-3.13E+00	pCi/L	4.53E+00	1.70E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Europium-154	-3.46E+00	pCi/L	2.08E+00	6.85E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Europium-154	-9.00E-02	pCi/L	1.62E+00	5.97E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Europium-154	1.49E+00	pCi/L	2.39E+00	9.36E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Europium-154	-9.84E-01	pCi/L	4.16E+00	1.49E+01	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Europium-154	4.40E+00	pCi/L	3.20E+00	1.32E+01	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Europium-154	-1.23E+00	pCi/L	2.81E+00	1.02E+01	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Europium-154	-2.71E+00	pCi/L	3.97E+00	1.20E+01	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Europium-155	-9.80E-01	pCi/L	3.24E+00	1.14E+01	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Europium-155	4.45E-01	pCi/L	4.30E+00	1.57E+01	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Europium-155	-4.37E-01	pCi/L	3.21E+00	1.14E+01	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Europium-155	2.28E+00	pCi/L	3.87E+00	1.33E+01	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Europium-155	-8.50E+00	pCi/L	5.27E+00	1.78E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Europium-155	-2.59E-02	pCi/L	4.58E+00	1.60E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Europium-155	9.38E+00	pCi/L	5.38E+00	2.03E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Europium-155	2.65E+00	pCi/L	6.37E+00	2.18E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Europium-155	4.43E-01	pCi/L	3.08E+00	1.02E+01	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Europium-155	4.79E+00	pCi/L	3.96E+00	1.42E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Europium-155	7.80E-01	pCi/L	3.23E+00	1.17E+01	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Europium-155	-2.82E+00	pCi/L	2.12E+00	7.17E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Europium-155	2.02E+00	pCi/L	3.85E+00	1.21E+01	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Europium-155	8.54E+00	pCi/L	2.37E+01	1.70E+01	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Europium-155	1.36E-01	pCi/L	4.75E+00	1.65E+01	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Europium-155	3.62E+00	pCi/L	3.49E+00	1.18E+01	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Europium-155	1.09E+01	pCi/L	4.08E+00	1.51E+01	—	UJ	GMS	91
TRA04101R4	03/19/2003	Blank	Manganese-54	-8.68E-01	pCi/L	8.89E-01	2.97E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Manganese-54	-6.98E-02	pCi/L	1.28E+00	4.76E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Manganese-54	1.87E+00	pCi/L	8.51E-01	3.45E+00	—	UJ	GMS	NA

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA02801R4	03/17/2003	PW-11	Manganese-54	5.72E-02	pCi/L	8.83E-01	3.25E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Manganese-54	4.16E+00	pCi/L	1.98E+00	7.41E+00	—	UJ	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Manganese-54	-1.21E+00	pCi/L	1.69E+00	5.67E+00	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Manganese-54	1.35E+00	pCi/L	1.88E+00	6.97E+00	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Manganese-54	-1.06E+00	pCi/L	1.85E+00	6.28E+00	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Manganese-54	-1.72E+00	pCi/L	1.29E+00	4.21E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Manganese-54	-3.51E-01	pCi/L	1.81E+00	6.65E+00	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Manganese-54	-1.42E+00	pCi/L	8.88E-01	2.87E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Manganese-54	-2.23E-01	pCi/L	5.28E-01	1.83E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Manganese-54	9.49E-01	pCi/L	8.61E-01	3.24E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Manganese-54	1.12E+00	pCi/L	1.39E+00	5.26E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Manganese-54	-3.67E-01	pCi/L	1.08E+00	3.77E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Manganese-54	1.24E-01	pCi/L	7.95E-01	2.91E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Manganese-54	-5.12E-01	pCi/L	1.14E+00	3.95E+00	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Niobium-95	7.88E-01	pCi/L	9.18E-01	3.47E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Niobium-95	2.25E+00	pCi/L	1.85E+00	7.38E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Niobium-95	5.59E-01	pCi/L	1.11E+00	4.09E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Niobium-95	3.46E+00	pCi/L	1.34E+00	4.13E+00	—	UJ	GMS	134.5
21320101R4	10/22/2002	PW-11	Niobium-95	1.04E+00	pCi/L	2.22E+00	8.20E+00	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Niobium-95	1.47E-01	pCi/L	1.80E+00	6.23E+00	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Niobium-95	1.89E+00	pCi/L	2.27E+00	8.53E+00	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Niobium-95	8.54E-02	pCi/L	2.10E+00	7.50E+00	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Niobium-95	-2.64E-01	pCi/L	1.43E+00	5.00E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Niobium-95	9.77E-01	pCi/L	2.32E+00	8.87E+00	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Niobium-95	3.97E-02	pCi/L	9.42E-01	3.40E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Niobium-95	-5.20E-01	pCi/L	7.10E-01	2.44E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Niobium-95	7.98E-01	pCi/L	9.61E-01	3.59E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Niobium-95	1.92E+00	pCi/L	1.75E+00	5.92E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Niobium-95	1.23E+00	pCi/L	1.39E+00	4.63E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Niobium-95	-3.38E-01	pCi/L	1.15E+00	4.06E+00	—	U	GMS	91

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Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
21320502R4	10/23/2002	USGS-054	Niobium-95	-1.35E+00	pCi/L	1.41E+00	4.75E+00	—	U	GMS	91
21321401R4	10/22/2002	Blank	Potassium-40	2.19E+01	pCi/L	1.68E+01	3.13E+01	—	U	GMS	NA
21320101R4	10/22/2002	PW-11	Potassium-40	3.14E+01	pCi/L	2.27E+01	9.18E+01	—	U	GMS	134.5
21320201R4	10/23/2002	PW-12	Potassium-40	0.00E+00	pCi/L	1.47E+01	6.39E+01	—	U	GMS	133
21321501R4	10/23/2002	Rinsate	Potassium-40	4.46E+01	pCi/L	1.04E+01	4.72E+01	—	—	GMS	NA
21320501R4	10/23/2002	USGS-054	Potassium-40	3.91E+01	pCi/L	1.65E+01	3.04E+01	—	J	GMS	91
21320502R4	10/23/2002	USGS-054	Potassium-40	3.22E+01	pCi/L	1.21E+01	5.28E+01	—	UJ	GMS	91
TRA04101R4	03/19/2003	Blank	Radium-226	2.69E+00	pCi/L	2.86E+00	7.40E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Radium-226	8.88E+00	pCi/L	3.66E+00	1.01E+01	—	UJ	GMS	NA
21321401R4	10/22/2002	Blank	Radium-226	1.89E+00	pCi/L	2.75E+00	6.65E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Radium-226	9.45E+00	pCi/L	3.72E+00	6.78E+00	—	J	GMS	134.5
21320101R4	10/22/2002	PW-11	Radium-226	0.00E+00	pCi/L	6.98E+00	1.26E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Radium-226	2.04E+01	pCi/L	5.28E+00	9.94E+00	—	J	GMS	133
TRA05301R4	06/09/2003	PW-12	Radium-226	4.42E+00	pCi/L	4.76E+00	1.17E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Radium-226	7.52E+00	pCi/L	5.77E+00	1.24E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Radium-226	6.36E+00	pCi/L	3.30E+00	6.92E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Radium-226	1.04E+01	pCi/L	5.95E+00	1.00E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Radium-226	1.21E+00	pCi/L	3.43E+00	7.18E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Radium-226	2.52E+00	pCi/L	2.43E+00	4.88E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Radium-226	4.42E+00	pCi/L	1.85E+00	7.15E+00	—	UJ	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Radium-226	5.49E+01	pCi/L	6.09E+00	9.09E+00	—	J	GMS	91
TRA03202R4	03/19/2003	USGS-054	Radium-226	5.16E+01	pCi/L	6.21E+00	8.62E+00	—	J	GMS	91
21320501R4	10/23/2002	USGS-054	Radium-226	5.13E+00	pCi/L	2.67E+00	7.74E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Radium-226	2.62E+00	pCi/L	2.95E+00	7.80E+00	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Ruthenium-103	-1.87E+00	pCi/L	9.20E-01	2.98E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Ruthenium-103	-1.36E+00	pCi/L	1.48E+00	5.24E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Ruthenium-103	-1.65E+00	pCi/L	9.63E-01	3.19E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Ruthenium-103	-7.56E-01	pCi/L	1.07E+00	3.61E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Ruthenium-103	1.63E+00	pCi/L	2.05E+00	7.67E+00	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Ruthenium-103	-9.29E-01	pCi/L	1.37E+00	4.76E+00	—	U	GMS	133

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA05301R4	06/09/2003	PW-12	Ruthenium-103	4.05E+00	pCi/L	2.04E+00	8.01E+00	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Ruthenium-103	-1.19E+00	pCi/L	1.99E+00	6.87E+00	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Ruthenium-103	-1.16E+00	pCi/L	1.23E+00	4.29E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Ruthenium-103	1.37E+00	pCi/L	1.94E+00	7.21E+00	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Ruthenium-103	2.27E-01	pCi/L	9.13E-01	3.36E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Ruthenium-103	-8.18E-01	pCi/L	7.10E-01	2.44E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Ruthenium-103	-2.07E+00	pCi/L	1.01E+00	3.28E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Ruthenium-103	-2.84E-01	pCi/L	1.44E+00	4.98E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Ruthenium-103	4.16E-01	pCi/L	1.17E+00	4.27E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Ruthenium-103	-2.32E+00	pCi/L	1.03E+00	3.37E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Ruthenium-103	-6.99E-01	pCi/L	1.30E+00	4.55E+00	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Ruthenium-106	-1.08E+00	pCi/L	7.44E+00	2.68E+01	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Ruthenium-106	6.53E+00	pCi/L	9.92E+00	3.99E+01	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Ruthenium-106	-4.43E+00	pCi/L	7.66E+00	2.69E+01	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Ruthenium-106	9.76E+00	pCi/L	8.57E+00	3.16E+01	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Ruthenium-106	3.88E+01	pCi/L	1.92E+01	5.21E+01	—	UJ	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Ruthenium-106	6.15E+00	pCi/L	1.23E+01	4.39E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Ruthenium-106	2.49E+00	pCi/L	1.56E+01	5.70E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Ruthenium-106	-1.80E+01	pCi/L	1.41E+01	4.65E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Ruthenium-106	-1.22E+00	pCi/L	9.94E+00	3.54E+01	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Ruthenium-106	-2.31E+01	pCi/L	1.55E+01	5.26E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Ruthenium-106	7.19E+00	pCi/L	7.15E+00	2.51E+01	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Ruthenium-106	4.33E+00	pCi/L	4.98E+00	1.82E+01	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Ruthenium-106	1.49E+01	pCi/L	8.28E+00	3.17E+01	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Ruthenium-106	7.97E+00	pCi/L	1.31E+01	4.68E+01	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Ruthenium-106	-1.20E+01	pCi/L	8.91E+00	2.95E+01	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Ruthenium-106	2.07E+00	pCi/L	6.30E+00	2.38E+01	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Ruthenium-106	1.03E+00	pCi/L	8.27E+00	3.05E+01	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Silver-108m	2.14E-01	pCi/L	8.18E-01	3.02E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Silver-108m	-1.63E-01	pCi/L	1.13E+00	4.24E+00	—	U	GMS	NA

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Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
21321401R4	10/22/2002	Blank	Silver-108m	1.69E+00	pCi/L	5.23E-01	2.45E+00	—	J	GMS	NA
TRA02801R4	03/17/2003	PW-11	Silver-108m	1.60E+00	pCi/L	8.69E-01	3.30E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Silver-108m	-8.56E-01	pCi/L	1.49E+00	5.32E+00	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Silver-108m	1.91E+00	pCi/L	1.13E+00	4.67E+00	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Silver-108m	7.33E-01	pCi/L	1.44E+00	5.44E+00	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Silver-108m	1.96E+00	pCi/L	1.21E+00	5.75E+00	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Silver-108m	2.84E-01	pCi/L	1.03E+00	3.54E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Silver-108m	3.80E+00	pCi/L	1.60E+00	6.38E+00	—	UJ	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Silver-108m	1.55E+00	pCi/L	8.47E-01	2.57E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Silver-108m	-7.95E-01	pCi/L	5.83E-01	1.85E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Silver-108m	7.74E-01	pCi/L	8.37E-01	3.10E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Silver-108m	1.01E+00	pCi/L	1.52E+00	5.37E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Silver-108m	-1.15E+00	pCi/L	1.11E+00	3.82E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Silver-108m	1.03E+00	pCi/L	8.95E-01	3.22E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Silver-108m	-8.80E-01	pCi/L	9.78E-01	3.41E+00	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Silver-110m	-3.99E-01	pCi/L	7.92E-01	2.79E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Silver-110m	-1.05E+00	pCi/L	9.63E-01	3.34E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Silver-110m	7.78E-01	pCi/L	8.18E-01	3.11E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Silver-110m	3.10E-02	pCi/L	8.10E-01	2.86E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Silver-110m	6.73E-01	pCi/L	1.72E+00	6.35E+00	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Silver-110m	1.33E+00	pCi/L	1.35E+00	4.86E+00	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Silver-110m	1.89E+00	pCi/L	1.49E+00	5.83E+00	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Silver-110m	-3.52E+00	pCi/L	1.74E+00	5.42E+00	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Silver-110m	2.85E+00	pCi/L	1.09E+00	4.23E+00	—	UJ	GMS	133
TRA05401R4	06/09/2003	PW-13	Silver-110m	1.79E+00	pCi/L	1.57E+00	6.35E+00	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Silver-110m	-2.02E+00	pCi/L	9.14E-01	2.92E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Silver-110m	-7.81E-02	pCi/L	5.18E-01	1.84E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Silver-110m	1.89E-01	pCi/L	8.80E-01	3.14E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Silver-110m	1.46E+00	pCi/L	1.48E+00	4.81E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Silver-110m	2.90E-01	pCi/L	1.09E+00	3.95E+00	—	U	GMS	91

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
21320501R4	10/23/2002	USGS-054	Silver-110m	-2.49E+00	pCi/L	1.06E+00	2.78E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Silver-110m	-9.90E-01	pCi/L	1.00E+00	3.42E+00	—	U	GMS	91
TRA04101RB	03/19/2003	Blank	Strontium-90	-3.72E-01	pCi/L	1.48E-01	6.86E-01	—	U	SRR	NA
TRA05501RB	06/09/2003	Blank	Strontium-90	-1.19E-01	pCi/L	1.75E-01	8.04E-01	—	U	GFP	NA
21321401RB	10/22/2002	Blank	Strontium-90	-1.80E-02	pCi/L	1.03E-01	5.22E-01	—	U	SRR	NA
TRA02801RB	03/17/2003	PW-11	Strontium-90	1.99E+00	pCi/L	3.51E-01	6.83E-01	—	—	SRR	134.5
21320101RB	10/22/2002	PW-11	Strontium-90	1.64E+00	pCi/L	2.98E-01	5.06E-01	—	—	SRR	134.5
TRA02901RB	03/17/2003	PW-12	Strontium-90	7.72E+01	pCi/L	1.15E+01	7.40E-01	—	—	SRR	133
TRA05301RB	06/09/2003	PW-12	Strontium-90	7.33E+01	pCi/L	9.39E+00	6.14E-01	—	—	GFP	133
TRA05302RB	06/09/2003	PW-12	Strontium-90	7.51E+01	pCi/L	9.27E+00	6.11E-01	—	—	GFP	133
21320201RB	10/23/2002	PW-12	Strontium-90	8.84E+01	pCi/L	1.20E+01	5.13E-01	—	—	SRR	133
TRA05401RB	06/09/2003	PW-13	Strontium-90	4.17E+01	pCi/L	5.25E+00	6.70E-01	—	—	GFP	87.5
TRA04201RB	03/19/2003	Rinsate	Strontium-90	-1.53E-02	pCi/L	1.57E-01	6.98E-01	—	U	SRR	NA
TRA05601RB	06/09/2003	Rinsate	Strontium-90	-1.70E-01	pCi/L	1.40E-01	6.60E-01	—	U	GFP	NA
21321501RB	10/23/2002	Rinsate	Strontium-90	4.57E-02	pCi/L	9.56E-02	4.62E-01	—	U	SRR	NA
TRA03201RB	03/19/2003	USGS-054	Strontium-90	6.69E+01	pCi/L	1.06E+01	7.00E-01	—	—	SRR	91
TRA03202RB	03/19/2003	USGS-054	Strontium-90	6.29E+01	pCi/L	9.96E+00	7.83E-01	—	—	SRR	91
21320501RB	10/23/2002	USGS-054	Strontium-90	6.31E+01	pCi/L	7.86E+00	4.05E-01	—	—	SRR	91
21320501RB(1)	10/23/2002	USGS-054	Strontium-90	6.46E+01	pCi/L	8.11E+00	7.90E-01	—	—	SRR	91
21320502RB	10/23/2002	USGS-054	Strontium-90	6.42E+01	pCi/L	8.30E+00	5.35E-01	—	—	SRR	91
TRA04101R8	03/19/2003	Blank	Tritium	6.46E+01	pCi/L	8.34E+01	2.85E+02	—	U	LSC	NA
TRA05501R8	06/09/2003	Blank	Tritium	-2.74E+02	pCi/L	9.85E+01	3.82E+02	—	U	LSC	NA
21321401R8	10/22/2002	Blank	Tritium	0.00E+00	pCi/L	8.23E+01	2.80E+02	—	U	LSC	NA
TRA02801R8	03/17/2003	PW-11	Tritium	4.38E+04	pCi/L	6.48E+02	2.61E+02	—	—	LSC	134.5
21320101R8	10/22/2002	PW-11	Tritium	5.02E+04	pCi/L	5.84E+02	2.82E+02	—	—	LSC	134.5
TRA02901R8	03/17/2003	PW-12	Tritium	4.43E+03	pCi/L	1.94E+02	2.71E+02	—	—	LSC	133
TRA05301R8	06/09/2003	PW-12	Tritium	2.40E+03	pCi/L	1.81E+02	3.87E+02	—	—	LSC	133
TRA05302R8	06/09/2003	PW-12	Tritium	2.27E+03	pCi/L	1.76E+02	3.80E+02	—	—	LSC	133
21320201R8	10/23/2002	PW-12	Tritium	3.04E+03	pCi/L	1.32E+02	2.77E+02	—	—	LSC	133
TRA05401R8	06/09/2003	PW-13	Tritium	-1.73E+02	pCi/L	1.02E+02	3.79E+02	—	U	LSC	87.5

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
TRA04201R8	03/19/2003	Rinsate	Tritium	1.90E+02	pCi/L	8.70E+01	2.79E+02	—	UJ	LSC	NA
TRA05601R8	06/09/2003	Rinsate	Tritium	-1.75E+02	pCi/L	1.03E+02	3.83E+02	—	U	LSC	NA
21321501R8	10/23/2002	Rinsate	Tritium	6.79E+01	pCi/L	9.39E+01	3.15E+02	—	U	LSC	NA
TRA03501R8	03/11/2003	TRA-06A	Tritium	2.51E+03	pCi/L	1.66E+02	2.81E+02	—	—	LSC	562
21320801R8	10/17/2002	TRA-06A	Tritium	2.49E+03	pCi/L	1.36E+02	3.15E+02	—	—	LSC	562
TRA03601R8	03/12/2003	TRA-07	Tritium	1.67E+04	pCi/L	4.16E+02	3.01E+02	—	—	LSC	501
21320901R8	10/16/2002	TRA-07	Tritium	1.45E+04	pCi/L	2.62E+02	2.78E+02	—	—	LSC	501
TRA03701R8	03/12/2003	TRA-08	Tritium	4.41E+03	pCi/L	2.13E+02	2.88E+02	—	—	LSC	501.5
21321001R8	10/22/2002	TRA-08	Tritium	5.31E+03	pCi/L	1.62E+02	2.79E+02	—	—	LSC	501.5
TRA03201R8	03/19/2003	USGS-054	Tritium	9.14E+02	pCi/L	1.15E+02	2.87E+02	—	—	LSC	91
TRA03202R8	03/19/2003	USGS-054	Tritium	1.09E+03	pCi/L	1.20E+02	2.83E+02	—	—	LSC	91
21320501R8	10/23/2002	USGS-054	Tritium	1.03E+03	pCi/L	1.02E+02	2.81E+02	—	—	LSC	91
21320501R8(1)	10/23/2002	USGS-054	Tritium	1.00E+03	pCi/L	1.10E+02	3.09E+02	—	—	LSC	91
21320502R8	10/23/2002	USGS-054	Tritium	1.19E+03	pCi/L	1.14E+02	3.11E+02	—	—	LSC	91
TRA03801R8	03/11/2003	USGS-058	Tritium	1.60E+03	pCi/L	1.41E+02	2.83E+02	—	—	LSC	503
21321101R8	10/21/2002	USGS-058	Tritium	1.74E+03	pCi/L	1.13E+02	2.78E+02	—	—	LSC	503
TRA03901R8	03/19/2003	USGS-065	Tritium	9.92E+03	pCi/L	2.89E+02	2.82E+02	—	—	LSC	498
21321201R8	10/22/2002	USGS-065	Tritium	1.07E+04	pCi/L	2.25E+02	2.84E+02	—	—	LSC	498
TRA04101R4	03/19/2003	Blank	Uranium-235	2.42E+00	pCi/L	5.87E+00	2.09E+01	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Uranium-235	1.55E+01	pCi/L	9.56E+00	3.28E+01	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Uranium-235	-4.20E+00	pCi/L	6.08E+00	2.09E+01	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Uranium-235	5.71E+00	pCi/L	7.22E+00	2.47E+01	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Uranium-235	2.24E+01	pCi/L	9.90E+00	3.64E+01	—	UJ	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Uranium-235	-3.98E+00	pCi/L	8.68E+00	2.97E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Uranium-235	-8.44E+00	pCi/L	1.02E+01	3.50E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Uranium-235	1.27E+01	pCi/L	1.21E+01	4.17E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Uranium-235	7.77E+00	pCi/L	9.16E+00	2.26E+01	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Uranium-235	3.66E+01	pCi/L	1.61E+01	3.15E+01	—	UJ	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Uranium-235	1.04E+01	pCi/L	9.88E+00	2.15E+01	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Uranium-235	9.92E+00	pCi/L	7.85E+00	1.47E+01	—	U	GMS	NA

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	Lab Flags	Val Flags	Method Code	Depth
21321501R4	10/23/2002	Rinsate	Uranium-235	5.76E+00	pCi/L	6.73E+00	2.33E+01	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Uranium-235	5.64E+00	pCi/L	1.28E+01	3.19E+01	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Uranium-235	7.23E+00	pCi/L	1.29E+01	3.12E+01	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Uranium-235	1.24E+01	pCi/L	6.18E+00	2.27E+01	—	UJ	GMS	91
21320502R4	10/23/2002	USGS-054	Uranium-235	-1.96E+00	pCi/L	7.95E+00	2.72E+01	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Zinc-65	1.50E+00	pCi/L	1.64E+00	6.64E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Zinc-65	-1.55E+00	pCi/L	2.77E+00	1.04E+01	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Zinc-65	-1.60E+00	pCi/L	1.98E+00	7.00E+00	—	U	GMS	NA
TRA02801R4	03/17/2003	PW-11	Zinc-65	-2.42E+00	pCi/L	2.10E+00	7.04E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Zinc-65	2.01E+00	pCi/L	4.30E+00	1.65E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Zinc-65	6.98E+00	pCi/L	4.70E+00	1.54E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Zinc-65	-6.75E+00	pCi/L	4.50E+00	1.51E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Zinc-65	-1.07E+01	pCi/L	4.68E+00	1.49E+01	—	U	GMS	133
21320201R4	10/23/2002	PW-12	Zinc-65	6.67E+00	pCi/L	2.87E+00	1.13E+01	—	UJ	GMS	133
TRA05401R4	06/09/2003	PW-13	Zinc-65	-6.92E+00	pCi/L	3.81E+00	1.16E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Zinc-65	-1.61E-01	pCi/L	1.96E+00	6.95E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Zinc-65	6.92E-02	pCi/L	1.25E+00	4.40E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Zinc-65	-3.31E+00	pCi/L	2.04E+00	5.54E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Zinc-65	-4.13E+00	pCi/L	3.36E+00	9.42E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Zinc-65	5.34E-01	pCi/L	2.31E+00	7.85E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Zinc-65	6.84E-01	pCi/L	1.93E+00	7.39E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Zinc-65	-2.26E+00	pCi/L	2.23E+00	7.82E+00	—	U	GMS	91
TRA04101R4	03/19/2003	Blank	Zirconium-95	1.55E+00	pCi/L	1.53E+00	5.84E+00	—	U	GMS	NA
TRA05501R4	06/09/2003	Blank	Zirconium-95	2.22E+00	pCi/L	2.55E+00	9.40E+00	—	U	GMS	NA
21321401R4	10/22/2002	Blank	Zirconium-95	3.25E+00	pCi/L	1.28E+00	6.66E+00	—	UJ	GMS	NA
TRA02801R4	03/17/2003	PW-11	Zirconium-95	-7.93E-01	pCi/L	1.71E+00	6.12E+00	—	U	GMS	134.5
21320101R4	10/22/2002	PW-11	Zirconium-95	-4.95E-01	pCi/L	3.42E+00	1.22E+01	—	U	GMS	134.5
TRA02901R4	03/17/2003	PW-12	Zirconium-95	1.27E-01	pCi/L	3.00E+00	1.04E+01	—	U	GMS	133
TRA05301R4	06/09/2003	PW-12	Zirconium-95	-3.20E+00	pCi/L	3.50E+00	1.18E+01	—	U	GMS	133
TRA05302R4	06/09/2003	PW-12	Zirconium-95	4.25E+00	pCi/L	3.58E+00	1.34E+01	—	U	GMS	133

Table A-1. (continued).

Field Sample Number	Sample Date	Well Name	Compound	Concentration	Sample Units	Error	MDA	LabFlags	ValFlags	Method Code	Depth
21320201R4	10/23/2002	PW-12	Zirconium-95	1.53E+00	pCi/L	2.07E+00	7.61E+00	—	U	GMS	133
TRA05401R4	06/09/2003	PW-13	Zirconium-95	4.81E+00	pCi/L	3.46E+00	1.41E+01	—	U	GMS	87.5
TRA04201R4	03/19/2003	Rinsate	Zirconium-95	-1.58E-01	pCi/L	1.43E+00	5.19E+00	—	U	GMS	NA
TRA05601R4	06/09/2003	Rinsate	Zirconium-95	-5.82E-01	pCi/L	1.08E+00	3.74E+00	—	U	GMS	NA
21321501R4	10/23/2002	Rinsate	Zirconium-95	-6.48E-01	pCi/L	1.47E+00	5.11E+00	—	U	GMS	NA
TRA03201R4	03/19/2003	USGS-054	Zirconium-95	-6.34E-01	pCi/L	2.32E+00	8.42E+00	—	U	GMS	91
TRA03202R4	03/19/2003	USGS-054	Zirconium-95	1.93E+00	pCi/L	1.90E+00	7.22E+00	—	U	GMS	91
21320501R4	10/23/2002	USGS-054	Zirconium-95	-4.26E-01	pCi/L	1.36E+00	4.92E+00	—	U	GMS	91
21320502R4	10/23/2002	USGS-054	Zirconium-95	-5.29E-01	pCi/L	1.90E+00	6.74E+00	—	U	GMS	91

Cadmium samples ending in UC = Filtered samples
Cadmium samples ending in 6C = Unfiltered samples
Chromium samples ending in CU = Filtered samples
Chromium samples ending in 5C = Unfiltered samples

Appendix B

Quality Assurance/Quality Control

Sample Results

Appendix B

Quality Assurance/Quality Control Sample Results

B-1. QUALITY ASSURANCE/QUALITY CONTROL SAMPLING

The purpose of collecting and analyzing quality assurance/quality control samples is to confirm the achievement of project objectives and data quality objectives. The overall objectives associated with Waste Area Group 2 annual groundwater monitoring are discussed in the groundwater monitoring plan (DOE-ID 2003). The overall objectives and quality assurance or quality control sample results for the fiscal year (FY) 2003 sampling effort are discussed in the following subsections.

B-1.1 Precision and Accuracy

The spatial variations in the concentrations of contaminants at individual sites create sampling variability. Additional variability, called measurement error, occurs during sample collection, handling, processing, analysis, quality evaluation, and reporting. Concentrations of contaminants reported represent the true concentrations in the media sampled plus the measurement error, which can be minimized but not eliminated. Though it may not be significant in many cases, it is important to assess the contribution of measurement error to the total error in individual investigations. The analytical results of quality control samples are used to estimate accuracy and precision, the quantitative descriptions of measurement error, and the bias.

B-1.1.1 Overall Precision

Precision is a measure of the reproducibility of measurements under a given set of conditions. In the field, precision is affected by sample collection procedures and the natural heterogeneity of the matrix. Overall precision (field and laboratory) can be evaluated by the use of duplicate samples collected in the field. Typically, greater precision is required for analytes with very low action levels that are close to background concentrations. Allowable laboratory precision for water samples is defined as having a relative percent difference (RPD) of less than or equal to 20%. Field precision is the difference between overall precision and laboratory precision. Table B-1 summarizes the precision for the FY 2003 round of groundwater monitoring. Using the following formula, the RPD was calculated only for those samples that were true positive values for both the initial sample and the field duplicate:

$$RPD = \frac{|S - D|}{S + D} \times 200 \quad (B-1)$$

where

S = sample

D = duplicate.

As can be seen from the data in Table B-1, the RPD does not exceed 20% for any of the analytes, so the overall precision of the FY 2003 data is considered acceptable.

Table B-1. Overall precision for FY 2003 analytical data.

Analyte	Sample	Duplicate	Units	RPD (%)
Chromium (Oct 02)	9.2	9.7	µg/L	5.35
Chromium (Mar 03)	9.7	9.21	µg/L	5.18
Radium-226 (Mar 03)	54.9	51.6	pCi/L	6.19
Strontium-90 (Oct 02)	63.1	64.2	pCi/L	4.32
Strontium-90 (Mar 03)	66.9	62.9	pCi/L	6.19
Tritium (Oct 02)	1030	1190	pCi/L	14.41
Tritium (Mar 03)	914	1090	pCi/L	17.56

B-1.1.2 Overall Accuracy

Accuracy is a measure of bias in a measurement system. Accuracy is affected by the methods used for sample preservation, sample handling, field contamination, and sample matrix. The effects of the first three are evaluated using the field blank, trip blank, and equipment rinsate results. The presence of a contaminant in the field blank, trip blank, or rinsate reveals that cross-contamination has occurred.

Laboratory accuracy is ensured through the use of standard methods and the use of calibration standards from the National Institute of Standards and Technology. All instrumentation is calibrated before use per the procedures outlined in the analytical methods required by the INEEL Sample and Analysis Management (SAM) statements of work. Laboratory accuracy is assessed through the use of matrix spikes and laboratory control samples. The number of laboratory quality control samples is specified in the analytical methods employed in the INEEL SAM statements of work. Evaluation criteria for the quality control samples are specified in data validation technical procedures administered by INEEL SAM. For samples analyzed in accordance with EPA Contract Laboratory Program protocol, validation is performed in accordance with that protocol. For the FY 2003 data set, the overall accuracy of the analyses is acceptable.

B-1.1.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which the sampling and analysis data accurately and precisely represent the characteristic of a population parameter being measured at a given sampling point or for a process or environmental condition. Representativeness is evaluated by determining whether measurements were accurate and the samples represent actual concentrations in the aquifer.

For the FY 2003 sampling activity, all measurements were made according to established Environmental Protection Agency (EPA) and INEEL SAM protocol. Trained personnel followed established INEEL procedures to collect the physical samples.

B-1.1.4 Comparability

Comparability is a qualitative characteristic that refers to the confidence with which one data set can be compared to another. At a minimum, comparable data must be obtained using unbiased sampling designs. If sampling designs are biased, the reasons for selecting another design should be well documented. Data comparability for this sampling activity was ensured through the following efforts:

- All data sets contained the same variables of interest.
- All measurements have been performed and results reported using common units.
- Similar analytical procedures and quality assurance measures have been used.
- All field and laboratory instrumentation had similar or better detection limits than historically employed.
- Established INEEL procedures were followed to collect samples.
- Wells selected for sampling are identical to those chosen historically.

Samples were collected in October and March. In an effort to negate any effect that changes in groundwater levels due to snowmelt and runoff may have on data collected, sampling rounds are conducted at approximately the same time of year.

B-1.2 Data Validation

Method data validation is the process whereby analytical data are reviewed against set criteria to ensure that the results conform to the requirements of the analytical method and any other specified requirements. For the FY 2003 sampling activities, all laboratory data were validated according to established INEEL SAM and EPA protocols. The limitations and validation reports were previously transmitted to the Agencies in December 2002 and May 2003. No major problems were identified during this method validation process.

B-2. REFERENCES

DOE-ID, 2003, *Groundwater Monitoring Plan for the Test Reactor Area Operable Unit 2-13*,
DOE/ID-10626, Rev. 2, U.S. Department of Energy Idaho Operations Office, February 2003